USDA United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with City of Baltimore, Maryland, and Maryland Agricultural Experiment Station

Soil Survey of City of Baltimore, Maryland

How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

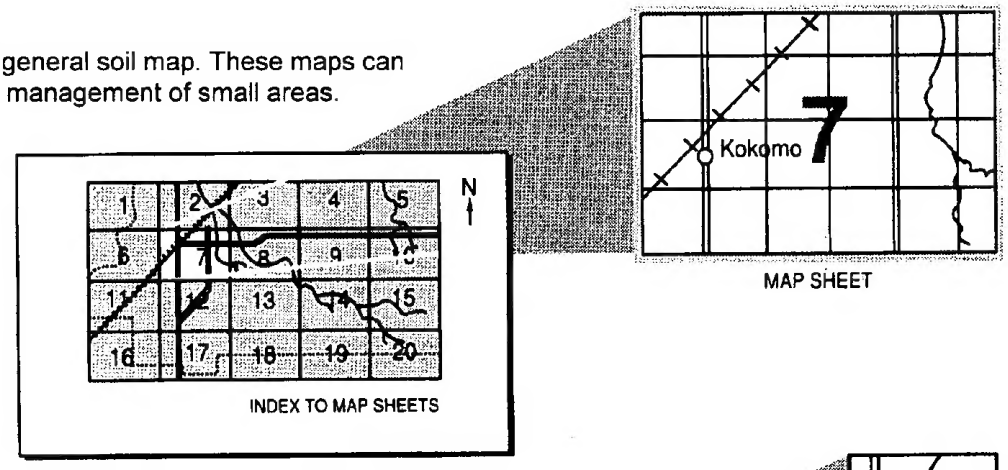
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1989. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Natural Resources Conservation Service and the Maryland Agricultural Experiment Station. The City of Baltimore, Department of Transportation, Environmental Services Division, provided partial funding for the survey. The survey is part of the technical assistance furnished to the City of Baltimore.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: The Inner Harbor of the City of Baltimore is in an area of Udorthents and Urban land.

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Issued 1998

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in the City of Baltimore, Maryland. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Agronomists and others can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of
City of Baltimore, Maryland

By Maxine J. Levin and Thomas M. Griffin, Natural Resources Conservation Service

Fieldwork by Maxine J. Levin and Thomas M. Griffin, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the City of Baltimore, Maryland, and the Maryland Agricultural Experiment Station

THE CITY OF BALTIMORE is located in the north-central part of Maryland. It has an area of 58,900 acres, or 92 square miles (fig. 1). The Patapsco River and part of the Chesapeake Bay cover about 7,500 acres of this area. The city is bounded on the east, north, west, and southwest by Baltimore County. On the south, from the Patapsco River to the Chesapeake Bay, it is bounded by Anne Arundel County.

About 75 percent of the soils in the City of Baltimore were altered during urbanization and related human activities. About 15 percent of altered soils were made from various fill material. The relatively undisturbed soils that make up 25 percent of the survey area are mostly in parks and open space.

This soil survey updates the portions of the Soil Survey of Baltimore County, published in 1919, that includes Baltimore City *(19)*. This survey also provides more information and larger maps that show the soils in greater detail.

Some of the boundaries on the soil maps do not match those on the soil maps of adjacent counties, and some of the soil names do not fully agree. The differences are the result of improvements in the classification of soils, particularly changes or refinements in the soil series concepts. Also, the intensity of mapping may vary or the extent of the soils may differ within the survey area.

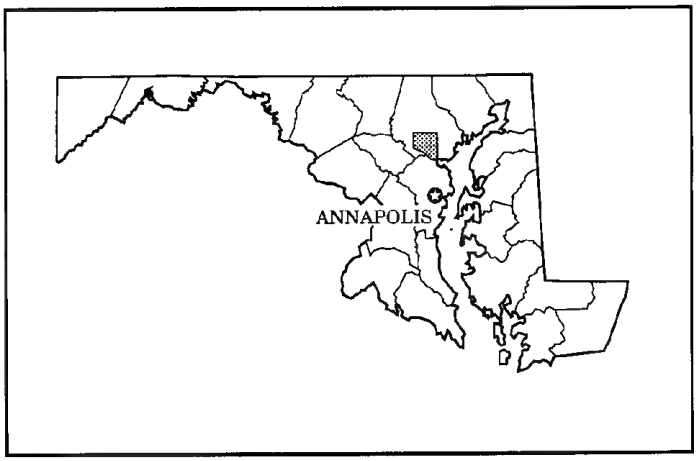

Figure 1.—Location of the City of Baltimore in Maryland.

General Nature of the Survey Area

The following is general information about the City of Baltimore, its history and population; transportation; physiography, drainage, and geology; water supply; climate; and original vegetation.

History and Population

Tracts of land near Baltimore City were patented in 1660, and settlement occurred during the early 1700's. Baltimore is situated on the Fall Line, the point that separates the Piedmont Plateau from the tidewater Coastal Plain. The city developed together with the Piedmont Plateau. A marketplace was needed at the Baltimore site as tobacco declined as an industry, as wheat increased as a provision for the West Indian sugar

colonies, and as iron became important as a strategic material.

Fast-moving streams running down from the Piedmont Plateau in Baltimore County converged near what became Baltimore Harbor. They provided many sites along the way for water-driven mills and iron furnaces. To develop farming, mills, and the iron industry and to control shipping of these products, the Maryland legislature set up small towns in the vicinity. In 1783 three villages were combined in founding the City of Baltimore: Baltimore Town, laid out in 1730; Jones Town, laid out in 1732; and Fells Point, laid out in 1763. By the 1780's, the marshes and streams that separated the three villages had been filled in or redirected and bridges had been built on major transport routes. A network of roads reached wheat fields, mills, and iron furnaces in the north. Wharves for shipping were built for the Fells Point and Basin areas *(10)*.

In the 1790's, the City of Baltimore achieved status as a major shipping center. Baltimore Clippers, built in shipyards in Fells Point, were the fastest moving vessels of their day *(15)*. But the cutting of timber and intensive traffic on unpaved streets caused accelerated erosion. The resulting problem was sedimentation of the harbor. Constant dredging was needed to keep open the harbor channels for shipping.

In the early 1800's, many great turnpike roads were built to the city. These included Reisterstown Road, Harford Road, Falls Road, and Washington Road. They allowed transport of freight year round. The railroad appeared in the City of Baltimore in the late 1820's. By 1861, the city was a major railroad hub for the Middle Atlantic States.

The City of Baltimore was both a strategic transportation center and a terminus of a major railroad route from Washington, D.C., to the northern industrial areas and the West. As a consequence, Union troops occupied the City of Baltimore during the Civil War (fig. 2).

During the second half of the 19th century, large waves of immigrants from Europe and rural African-Americans from the South arrived in Baltimore. They labored in the continually growing shipping and manufacturing industries. As new arrivals moved into housing near wharves and industrial factories, the established residents moved toward higher ground in the suburbs. At first they moved to Eutaw Place, Bolton Hill, Mount Royal, Peabody Heights (now Charles Village), and Highlandtown. In the early 1900's, they moved to Roland Park, Guilford, Mount Washington, and Lauraville. The upwardly mobile moved in behind them *(8, 10)*.

Major city parks were established or extended at that time: Druid Hill Park, Carroll Park, Clifton Park, and Patterson Park. Most of the downtown area was destroyed during the great fire of 1904. Above ground, the city was rebuilt much as it was before, but streets were widened. Below ground, the sewer system was reworked and new, high pressure water lines and electrical conduits were laid. The underground infrastructure was totally reorganized; municipal agencies were created to plan future development. To fund this new development, a larger tax base was needed and the northern suburbs were eventually annexed.

During the early 1900's, coal, steel, gas, and electric companies predominated in the tidewater areas of Spring Gardens, Westport, Caton, Sparrows Point, and Curtis Bay. Dredging operations that kept shipping lines open provided sludge and fill to reshape the harbor and to expand new real estate for industrial sites. During the late 1920's, Logan Airport (now Dundalk Marine Terminal) was built entirely on river dredgings and sludge.

During the two World Wars, the City of Baltimore became a prime location for steel production and shipbuilding. Industrial development became a serious threat to water supplies and the delicate tidewater environment. From the 1950's through the 1980's, the harbor channel was deepened to 50 feet for large-scale cargo ships. In 1967, the Maryland Port Authority was created to modernize Baltimore Harbor from a railroad port to container handling. The Baltimore Beltway (Interstate 695) was opened in 1962.

During the building boom and industrial expansion outside the beltway, the inner city suffered serious deterioration *(10)*. During the late 1960's and early 1970's, neighborhood restoration projects, "dollar houses," urban homesteaders, and urban renewal were early attempts to revitalize the core city *(8)*. "Dollar houses" were immediately inhabitable houses made available through a housing program to urban homesteaders for $1 each. The Inner Harbor was rebuilt as a tourist attraction and downtown center. These projects and many grassroots renewal projects have won Baltimore national attention for its "urban renaissance."

According to the U.S. Bureau of Census, the population of the City of Baltimore was 786,775 in 1980. This represented a 13 percent decline from 1970 and a 15 percent decline from the city's census peak of 949,800 in 1950. Census figures show that the population decline has slowed to less than 5 percent since 1980 *(13)*.

Transportation

Among the major local, State, and Federal highways serving the City of Baltimore are the Gladys Noon Spellman Parkway (Baltimore-Washington Parkway, MD-295), the Baltimore Beltway (I-695), the Jones Falls Expressway (I-83), Pulaski Highway (US-40), Northern Parkway, and Perring Parkway; Belair Road (US-1), Maryland Routes 2, 3, 170, and 710; and Interstate

Figure 2.—The B&O Railroad Museum preserves the history of Baltimore as a major railroad hub and strategic transportation center.

Routes 70, 95, 395, 795, and 895. Important transportation links are the Fort McHenry Tunnel, the Baltimore Harbor Tunnel, and the Francis Scott Key Memorial Bridge.

Four railroads serve the City of Baltimore. Passenger train service is available at Pennsylvania Station on Charles Street. MARC, a commuter rail line, makes another stop at Camden Yards near Oriole Park and the Inner Harbor. The main railroad freight terminals are at Bay View Yards, Curtis Bay, and Locust Point. A rapid transit system connecting downtown Baltimore to the northwestern suburbs opened in November 1983. A plan to connect the northeastern suburbs to the system is scheduled for completion in the late 1990's. The Maryland Port Authority administers Dundalk Marine Terminal and Locust Point Marine Terminal, which are the major shipping yards for Baltimore Harbor.

About 4 miles south of the City of Baltimore is the Baltimore-Washington International Airport. Among the small, local airports that also serve the area are Essex Skypark on the east side of Back River, Martin State Airport near Middle River, and Baltimore Air Park near White Marsh *(17)*.

Physiography, Drainage, and Geology

This section was prepared by Maxine J. Levin, soil scientist, Natural Resources Conservation Service, Jonathan Edwards, Maryland Geologic Survey, and Jim O'Connor, University of the District of Columbia.

Baltimore City lies within two physiographic provinces, the Piedmont Plateau and the Atlantic Coastal Plain. The north-northeast trending Fall Line separates the two provinces, dividing the city in half. Most of the city is characterized by nearly level to gently rolling uplands, dissected by narrow stream valleys. Hilly areas and steep side slopes border the deeper stream valleys, particularly along the Fall Line, concentrating the flow of water in these watersheds into fast-moving, high-energy streams.

The south- and southeast-flowing streams and their tributaries form an intricate dendritic drainage network. The Gwynns Falls and Jones Falls stream systems flow into the Patapsco River. Herring Run flows into the Back River outside the city limits. Both rivers are northern estuarine systems of the Chesapeake Bay.

Elevations range from sea level, where the Patapsco River is a tidal estuary, to as much as 480 feet on a ridge on the Piedmont Plateau in the northwestern part of the city. The highest elevations are on the interstream ridges on the Piedmont Plateau in the north and northwest sections of the city. These ridges descend gradually to the Coastal Plain in the south and east, where hilltop elevations average about 250 feet.

The Piedmont Plateau in the City of Baltimore is underlain by old igneous and metamorphic rocks. The Coastal Plain in the city is underlain by much younger, poorly consolidated sediments. Small areas in both physiographic provinces are covered by unconsolidated terrace and alluvial deposits.

Most of the interstream uplands on the Piedmont Plateau formed in saprolite. Saprolite is a weathered mantle of bedrock, and consists of reddish-brown, earthy material. Although it retains the structure of the original crystalline bedrock, it can readily be dug by shovel. Saprolite is a sticky, sandy, silty, clayey, or micaceous material that grades downward into unweathered rock at an average depth of 50 feet, but locally may exceed 100 feet *(9)*. Saprolite is largely absent along the valley walls of Jones Falls, where the stream has cut a channel into hard bedrock. Gwynns Falls and Herring Run also are bordered by bedrock near the point where the Fall Line crosses their stream paths.

Metamorphic crystalline rocks of the Baltimore Mafic complex are predominant on the Piedmont Plateau within the City of Baltimore. These metamorphosed mafic or dark ferromagnesian, igneous rocks are of Cambrian age. They include Mount Washington Amphibolite in the northwest and southwest and Hollofield Ultramafite in the intervening Forest Park, Lake Ashburton, and Cylburn Park areas. Raspeburg Amphibolite lies in the northeastern part of the city. Felsic rocks of the James Run Formation, Jones Falls Schist, and Perry Hall Gneiss occur southeast of the belt of mafic rocks. These formations are covered by younger sediments on the Coastal Plain. Along the northern border of the city, Baltimore Gneiss of Precambrian age is present in the core of the Towson Dome. It is overlain by Setters Quartzite and mica schist of the Loch Raven and Oella Formations. A small area of Cockeysville Marble has been mapped in the central part of the city, near Lake Montebello *(5)*.

The most intensely folded and layered rocks are the mica schists of the Loch Raven, Oella, and Jones Falls Formations and Precambrian Baltimore Gneiss. The massive amphibolites are the least folded and layered. All the hard crystalline rocks are broken by joints and in places have been intruded by younger igneous rocks, such as Cold Spring Gneiss and minor dikes of pegamite. A small body of Gunpowder Gneiss lies in the extreme northeastern part of the city *(5)*. Most crystalline rocks have been quarried locally for building stone, riprap, and fill.

On the Coastal Plain in the City of Baltimore, the underlying hard rocks and saprolite have been covered by poorly consolidated, fluvial sediments that dip to the southeast at an angle of only a few degrees *(14)*. The Coastal Plain sediments range in thickness from a few feet along the Fall Line and in erosional remnants on ridges in the northeast to more than 500 feet in areas south of Curtis Bay *(9)*.

The Coastal Plain strata within the city belong largely to the Potomac Group of Lower Cretaceous age. Along the Fall Line and to the north, these sediments consist mainly of sand and gravel and minor amounts of silt and dark clay. They have been assigned to the Patuxent Formation, the lowest and oldest of the group. These sediments were deposited in high gradient, braided stream complexes. Silt and clay lenses formed in areas of depressions or abandoned stream channels. The gravel is generally poorly sorted, containing subrounded quartz and quartzite pebbles and weathered lithic fragments in a medium- to coarse-grained quartzose sand matrix. The pebbles have an average diameter of 0.75 inch, but some elongated, subrounded cobbles are as much as 10 inches in diameter. Crossbedded sand, pebbly sand, and quartz gravel occur as lenses or extensive layers. Silt and clay beds or lenses are widespread, and hard, ferruginous concretions or ironstone layers are common.

Silty and sandy clay mixed with interbedded sand and gravel make up the upper, or younger, parts of the Potomac Group. These are the Arundel and Patapsco Formations. In these formations the clay lenses are mainly mottled red and yellow, but may range to gray and black where they are carbonaceous. Scattered limonite and siderite lenses are also present. The main clay minerals are kaolinite and illite. In some areas the surface clay was once mined as raw material for brickyards. The sand facies are well sorted, medium- to fine-grained quartz sand and localized areas of quartz gravel. Ironstone typically forms at the sand-clay boundaries. These sediments were deposited in and adjacent to channels of low gradient streams or within backswamps or flood plains. Plant spores and carbonaceous impressions, large logs, and rare dinosaur remains are the chief nonmarine fossils preserved in the Potomac Group beds *(6)*.

Small, poorly expressed areas of the Lowland Deposits

are found south of Canton Yard and east of Colgate Creek and on Fairfield and Wagners Points. Younger than the Potomac Group, these beds were laid down in Late Pleistocene time. These units consist of buff to orange colored, poorly sorted and poorly bedded, quartz silts and kaolinite, illite, and montmorillonite clays *(14)*. Most areas have been disturbed with additions of fill or dredged material *(9)* and are now highly industrialized.

Water Supply

The Department of Public Works, Baltimore City, provides water for the City of Baltimore from three sources: the Gunpowder Falls, the North Branch of the Patapsco River, and the Susquehanna River. The Gunpowder Falls water development has a watershed of 303 square miles. Two reservoirs having a combined capacity of 43 billion gallons are located on this major stream. One is Loch Raven Reservoir; the other, farther upstream near the mouth of Prettyboy Creek, is Prettyboy Reservoir. Most of this water is delivered by gravity to the Montebello Filtration Plants. The Patapsco River development has a watershed of 164 square miles. It collects water in the Liberty Reservoir near Falls Run on the North Branch of the river. Its capacity of 43 billion gallons is delivered to the Ashburton Filtration Plant. The Susquehanna Water Supply project consists of the Conowingo Intake (capacity of 250 million gallons a day) and the Deer Creek Pumping Station (capacity of 243 million gallons a day). The connecting tunnel and pipelines are 38.27 miles long.

To produce water that meets the accepted standard for public drinking water, the following treatment processes are performed: chlorination, coagulation, sedimentation, filtration, fluoridation, and pH adjustment. The water is treated and filtered at three facilities: the Montebello Filtration Plant built in 1915, the Montebello Filtration Plant completed in 1928, and the Lake Ashburton Filtration Plant, completed in 1956.

The distribution system supplies water to Baltimore City and parts of three adjacent counties. Baltimore, Howard, and Anne Arundel. It consists of a network of mains varying in size from 3 inches to 9 feet in diameter that connect a series of pumping stations, reservoirs, and elevated storage tanks. Some of the major inner city reservoirs are Lake Ashburton, Druid Lake, Guilford Reservoir, and Lake Montebello. The 15 active pumping stations in the system have a total capacity of 435 million gallons a day. The City of Baltimore water system is divided into five pressure zones based on limiting ground elevations; the first three zones serve areas within the city limits. In 1979 the average daily per capita use was 158 gallons per person per day *(3)*.

Climate

The City of Baltimore is hot in summer and rather cold in winter. Precipitation is well distributed throughout the year and is normally adequate for all crops. Winter precipitation frequently occurs as snow, but the ground does not usually stay covered for more than a few days at a time.

Table 1 gives data on temperature and precipitation for the survey area as recorded at the Baltimore Weather Service Office in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 37 degrees F, and the average daily minimum temperature is 30 degrees. The lowest temperature on record, which occurred at Baltimore Weather Service Office on February 10, 1899, is -7 degrees. In summer, the average temperature is 78 degrees, and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred at Baltimore Weather Service Office on July 10, 1936, is 107 degrees.

Growing degree days are shown in table 3. They are equivalent to ""heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 42.34 inches. Of this, about 22.06 inches, or 52 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 7.62 inches on August 23, 1933. Thunderstorms occur on about 28 days each year, and most occur in July.

The average seasonal snowfall is 20.5 inches. The greatest snow depth at any one time during the period of record was 24 inches. On an average, 7 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 23.3 inches.

The average relative humidity in midafternoon is about 54 percent. Humidity is higher at night, and the average at dawn is about 77 percent. The sun shines 63 percent of the time possible in summer and 52 percent in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 10.9 miles per hour, in March.

Original Vegetation

The dominant native vegetation on most of the well drained and somewhat excessively drained loamy soils of

the Piedmont Plateau was deciduous forest *(16,24)*. The major species were chestnut, black oak, white oak, chestnut oak, scarlet oak, mockernut hickory, and pignut hickory. On the moderately well drained or somewhat poorly drained soils on flats, in depressions, at the foot of hills, and around the heads of drainageways, the dominant vegetation was beech, red maple, bitternut hickory, yellow-poplar, black walnut, and blackgum. Small, pure stands of Virginia pine were common in the nearly level to gently sloping areas of the Piedmont Plateau. These areas represented the earliest stage in the reforestation of areas formerly occupied by deciduous forest. The understory on the Piedmont Plateau consisted of dogwood and such evergreens as holly, laurel, and rhododendron. On the flood plains the dominant species were swamp oak, river birch, white ash, white willow, and hornbeam.

The native vegetation of most of the Coastal Plain in the City of Baltimore was stands of hardwoods that had softwoods scattered throughout. In many areas of the well drained upland soils that are underlain by Cretaceous clay, chestnut oak, white oak, black oak, blackjack oak, sassafras, and Virginia pine were dominant *(25)*. In upland depressions and other areas where the soils are not well drained, the dominant species were sweetgum, ash, elm, birch, sycamore, blackgum, hickory, and willow oak. On sandy and loamy upland soils, the major species were white oak, pin oak, black oak, red oak, chestnut, and hickory. In depressional areas where the soils are not well drained, yellow-poplar and beech were common; in the sandy, nearly level, moist areas, sweetgum and loblolly pine were dominant. On the droughty gravelly soils of the Coastal Plain, the dominant vegetation was Virginia pine, blackjack oak, post oak, black locust, and red cedar. The plants that made up much of the understory on the Coastal Plain were holly, dogwood, laurel, red cedar, persimmon, sassafras, and sumac. The dominant species on the flood plains were birch, elm, alder, willow, swamp maple, sycamore, and beech.

Many years ago, much of the area near the outlets of Gwynns Falls and Jones Falls was marshland. Other marshes along the Patapsco River and on Reed Bird Island supported pondweed, cattail, various grasses, sedges, herbs, and other aquatic plants.

Most of the native vegetation of the City of Baltimore has been destroyed during urbanization and other activities of humans. The relatively undisturbed park areas of Clyburn Park, Leakin Park, Gwynns Falls Park, Herring Run Park, and Druid Hill Park are some of the few areas where a number of species that were a part of the native vegetation still grow. Many parks and other areas of the City of Baltimore contain trees and shrubs that were domestic or foreign transplants.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the

arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Each association is rated for *woodland, urban uses,* and *recreation areas.* Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Extensive recreation areas are those used for nature study and as wilderness.

The general soil map at the back of this survey does not join, in all instances, with the general soil maps of adjacent counties. The differences in the maps with regard to the general soil map for the City of Baltimore are the result of both the larger scale of the map for the City of Baltimore and the recent advances in classification. The larger scale, however, presents more detail.

1. Urban Land-Legore Association

Urban land and very deep, nearly level to moderately sloping, well drained soils that are underlain by semibasic or mixed basic and acidic rocks; on uplands

This association consists of areas of Urban land and nearly level, broad ridgetops and shallow drainages to moderately sloping side slopes on the Piedmont Plateau in the City of Baltimore. The largest areas are in the northwestern corner of the city, in the central part of the city north of Northern Parkway, in wooded areas in Leakin Park, Gwynns Falls Park, Cylburn Arboretum, and in the northern half of Druid Hill Park.

This association makes up about 34 percent of the total land area of the City of Baltimore. It is about 43 percent Urban land, 22 percent Legore soils, and 35 percent soils of minor extent (fig. 3).

Urban land consists of areas that are covered by structures and engineering works. Most soil material around building foundations and most fill material used to support structures consist mainly of cut and graded Legore soils. Urban land generally is on the gentler slopes.

Legore soils are very deep, well drained, loamy soils that overlie semibasic or mixed basic and acidic rock at a depth of about 5 to 10 feet. These soils are generally on the nearly level to moderately sloping ridgetops and side slopes.

Minor soils in this association are well drained Montalto, Chester, and Relay soils on ridgetops and side slopes, somewhat excessively drained Manor, Brandywine, and Joppa soils on side slopes, well drained Sassafras soils on moderately sloping side slopes, poorly drained Baile soils in depressions and drainages, Udorthents in areas of cut, filled, or otherwise disturbed land, and Fluvents on flood plains or in narrow drainageways.

About half of this association is covered by structures and engineering works. Areas that have not been urbanized include parks, playgrounds, vacant lots, isolated tracts of wooded land, and yards and open space between and around buildings.

This association has only fair potential for landscaping and vegetable gardens because of slope and urbanization. It has only fair potential for urban use because of slope. It has only fair potential for use as intensive recreation areas and poor potential for use as extensive recreation areas because of limited space.

2. Urban Land-Joppa-Sassafras Association

Urban land and very deep, somewhat excessively drained and well drained soils that are underlain by sandy or gravelly sediments; on uplands

This association consists of areas of Urban land and nearly level to moderately sloping uplands on the Coastal

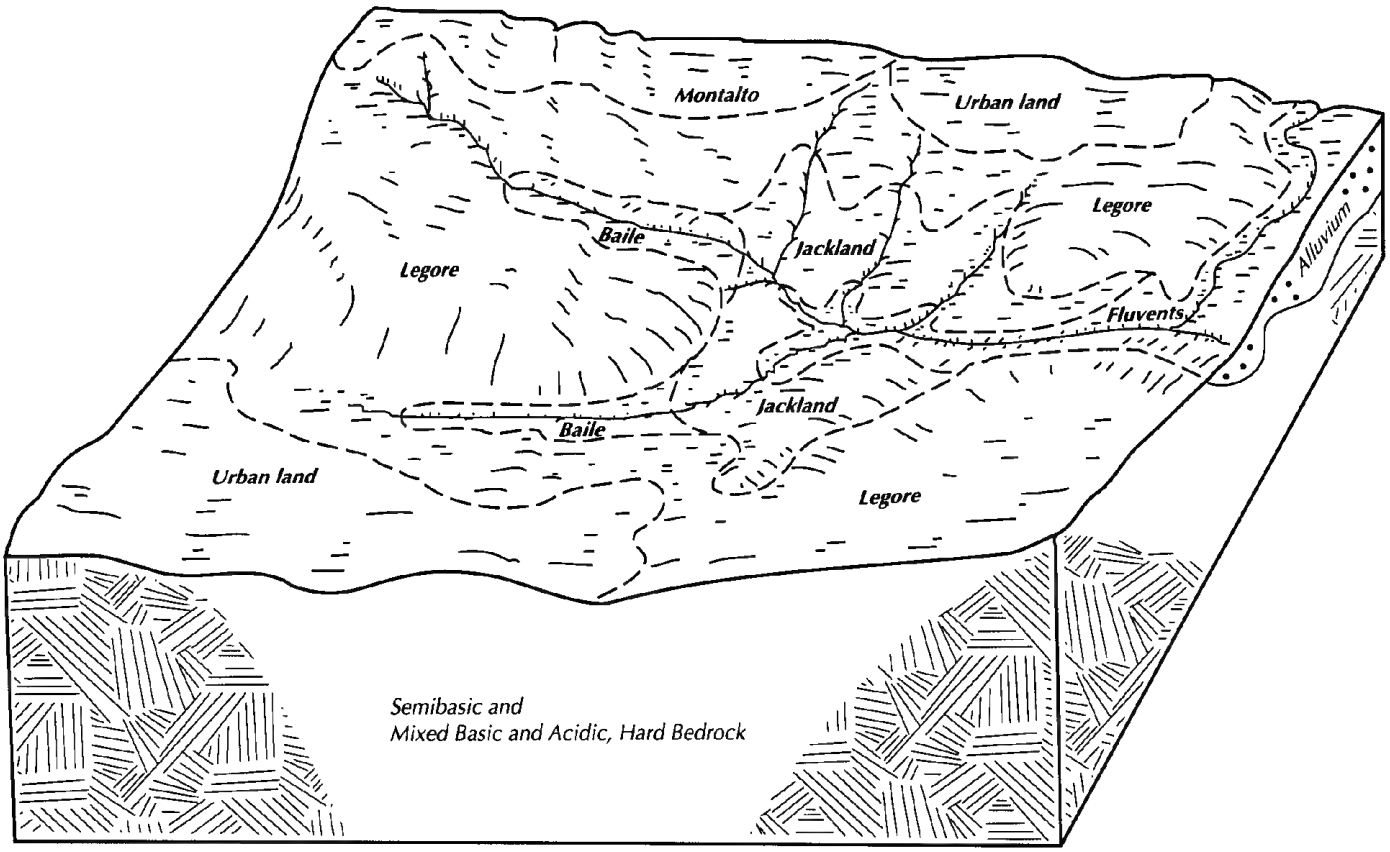

Figure 3.—Pattern of soils in the Urban land-Legore association.

Plain in the City of Baltimore. The largest areas are in the central and northeastern parts of the city.

This association makes up about 18 percent of the total land area of the City of Baltimore. It is about 40 percent Urban land, 15 percent Joppa soils, 10 percent Sassafras soils, and 35 percent soils of minor extent (fig. 4).

Urban land consists of areas that are occupied by structures and engineering works. Most soil material around building foundations and most fill material used to support structures consist mainly of cut and graded Joppa and Sassafras soils. Urban land generally is on the gentler slopes.

Joppa soils are very deep, somewhat excessively drained, gravelly soils that overlie gravelly and sandy sediments. They are generally on rolling to hilly, dissected side slopes.

Sassafras soils are very deep, well drained, loamy soils that overlie sandy or gravelly sediments at a depth of 40 inches or more. They are generally on gently rolling to hilly, dissected side slopes.

Minor soils in this association are the somewhat excessively drained Brandywine and Manor soils on steep side slopes near major drainages, somewhat excessively drained Joppa soils with a substratum of soft gneiss or schist bedrock on moderately sloping side slopes near major drainages, well drained Chester soils on gently sloping side slopes near major drainages, moderately well drained Mattapex, Beltsville, and Woodstown soils in upland depressions, Udorthents in areas of cut, filled, or otherwise disturbed land, and Fluvents on flood plains or in narrow drainageways.

About half of this association is occupied by structures and engineering works. Areas that have not been urbanized include playgrounds, small parks, vacant lots, small isolated tracts of land, and yards and open space around and between buildings.

This association has only fair potential for landscaping because of droughtiness. It has good potential for vegetable gardens and urban uses. It has only fair potential for intensive recreation areas and only poor potential for extensive recreation areas because of limited space.

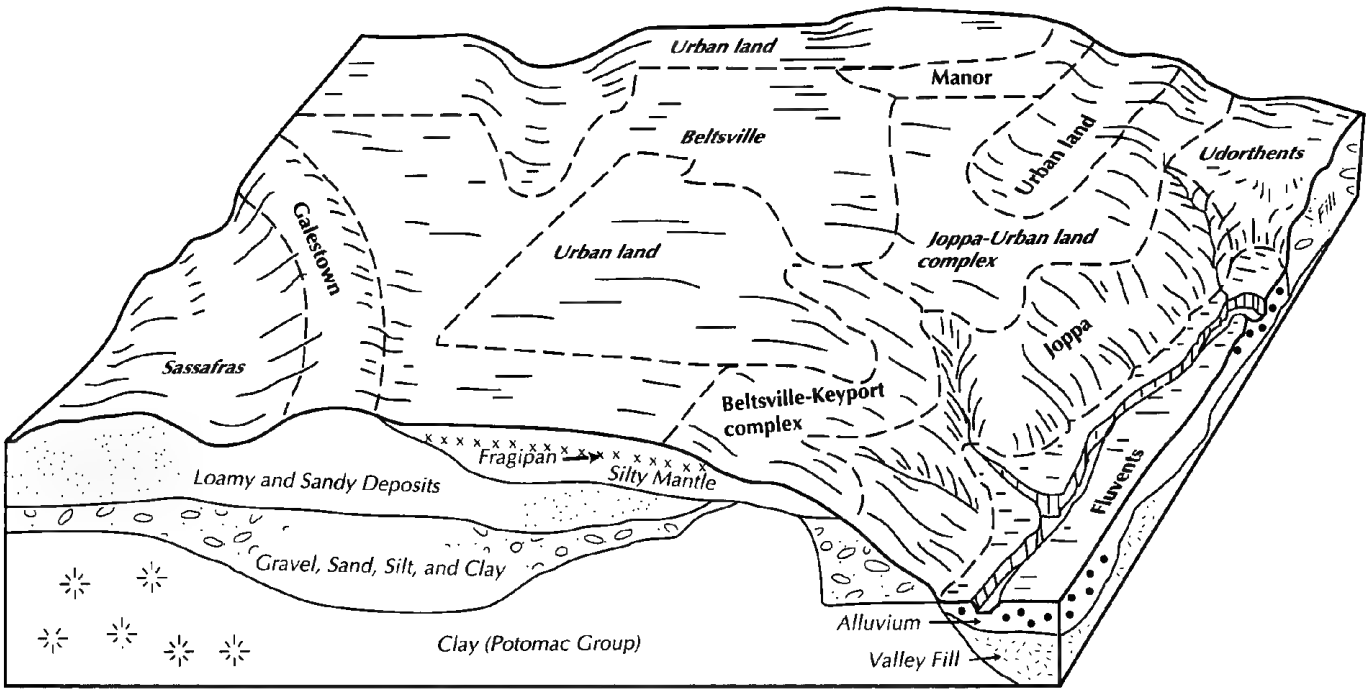

Figure 4.—Pattern of soils in the Urban land-Joppa-Sassafras association.

3. Urban Land-Sunnyside Association

Urban land and very deep, nearly level to moderately sloping, well drained soils that are underlain by unstable clayey sediment; on uplands

This association consists of areas of Urban land and nearly level to moderately sloping dissected uplands on the Coastal Plain in the City of Baltimore. The largest areas are scattered in northwest-trending beds in the southwestern, central, and eastern parts of the city in Violetville, Morrell Park, Lakeland, Mount Winans, Cherryhill, South Baltimore, Patterson Park, Joseph Lee Park, and Moores Run Park.

This association makes up about 24 percent of the total land area of the City of Baltimore. It is about 54 percent Urban land, 11 percent Sunnyside soils, and 35 percent soils of minor extent (fig. 5).

Urban land consists of areas that are covered by structures and engineering works. Most soil materials around building foundations and most fill materials used to support structures consist mainly of cut and graded Sunnyside soils. Urban land generally is on the gentler slopes.

Sunnyside soils are very deep, well drained, loamy or sandy soils that overlie unstable clayey material at a depth of 40 inches or more. They are generally on gently rolling to hilly, dissected side slopes.

Minor soils in this association are the somewhat excessively drained Galestown and Joppa soils on ridgetops and steep side slopes, the well drained Christiana soils on side slopes, Udorthents in areas of cut, filled, or otherwise disturbed land, the moderately well drained Beltsville, Keyport, Mattapex, and Woodstown soils, the somewhat poorly drained Leonardtown soils near drainageways, and the poorly drained Elkton soils in drainageways and depressions.

About half of this association is occupied by structures and engineering works. Areas that have not been urbanized include parks, playgrounds, and vacant lots, isolated wooded tracts, and yards and open space around and between buildings.

Poor stability is a limitation for most urban uses in this association. Overall, this association has only fair potential for landscaping and vegetable gardens because of slope and clayey material exposed during urbanization. It has only fair potential for use as intensive recreation areas and poor potential for use as extensive recreation areas because of limited space.

4. Udorthents-Urban Land Association

Very deep to moderately deep, nearly level to steep, well drained to poorly drained soils that are underlain by stratified alluvial sediment, dredged material, or cut, filled,

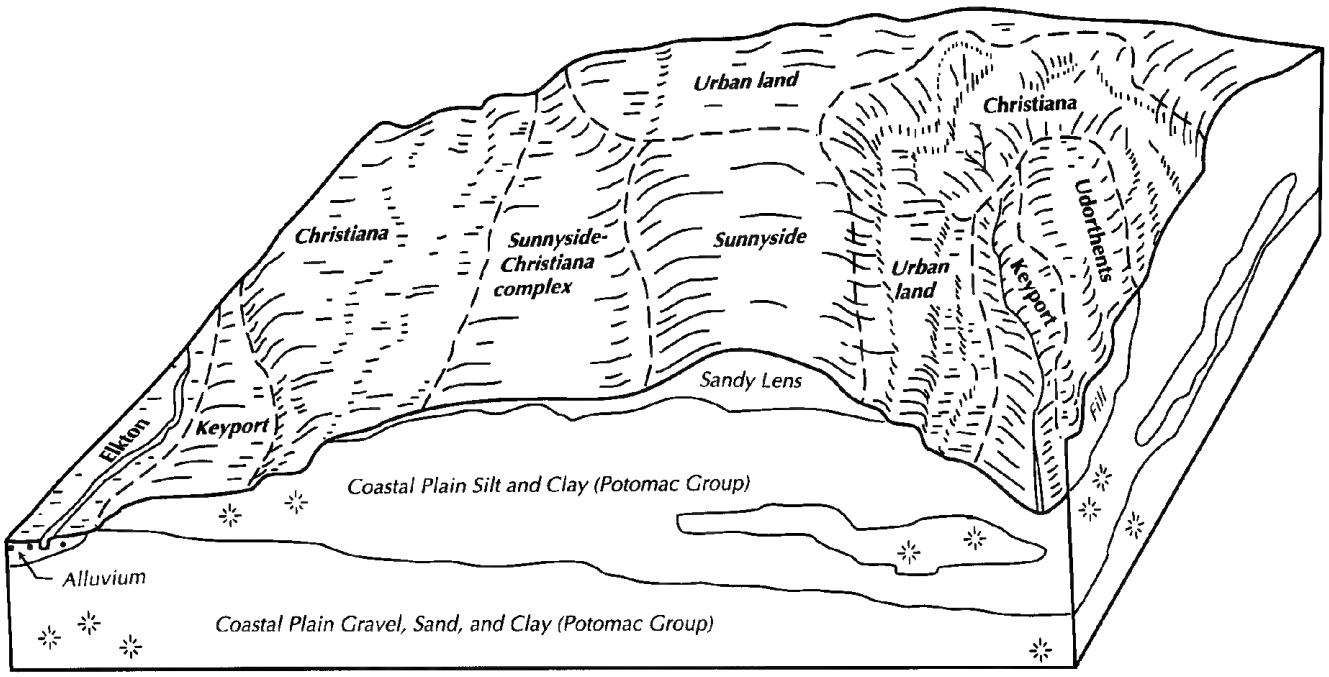

Figure 5.—Pattern of soils in the Urban land-Sunnyside association.

or otherwise disturbed land and Urban land; on all landscape positions

This association consists of nearly level to moderately sloping areas that are occupied by structures and engineering works and areas of nearly level to steep, highly disturbed uplands. This association occurs throughout the survey area but the largest areas are in and near the downtown business district and the industrialized harbor areas around Curtis Bay, Canton, Colgate, and Dundalk Marine Terminal.

This association makes up about 24 percent of the total land area of the City of Baltimore. It is about 36 percent Udorthents, 29 percent Urban land, and 35 percent soils of minor extent.

Udorthents consist of manmade, nearly level to steep soils. These soils consist of cut, filled, or otherwise disturbed areas. The cut areas are generally the steeper parts of the landscape, and the fill areas generally have smoother, less sloping topography.

Urban land consists of nearly level to moderately sloping areas more than 80 percent of which are covered by asphalt, concrete, buildings, or other impervious surfaces. Examples are parking lots, shopping and business centers, and industrial parks.

The texture of the soils in this association is variable. However, generally it reflects that of soils mapped in adjacent areas. In some areas these soils contain artifacts; in other areas they were once used as sanitary landfills and are underlain by refuse. In some areas these soils were created from materials dredged from the Patapsco River. Udorthents generally are on higher elevations and not subject to flooding.

Minor soils in this association are flooded Sulfaquepts in tidal marshes and Sulfaquepts in manmade areas filled with dredged material and Beltsville, Christiana, Keyport, Sassafras, Sunnyside, and Woodstown soils in small parks or other isolated, relatively undisturbed areas. Also included are Fluvents or stratified alluvial sediments with variable textures and drainage classes. These soils are on flood plains and in stream drainageways and are subject to frequent flooding.

Because of the high percentage of urbanization, this association is too variable to rate for vegetable gardens, recreation, and urban use. Onsite investigation is needed to determine the potentials for these uses.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Sunnyside fine sandy loam, 0 to 8 percent slopes, is one of several phases of the Sunnyside series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern on the landscape or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Sunnyside-Urban land complex, 0 to 8 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ

substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

1UB—Baile-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, poorly drained Baile soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent, but ranges to 8 percent in some areas. This unit is in upland depressions and on foot slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 25 acres in size. The Baile soil and Urban land are in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is the relatively undisturbed Baile soil. Typically, the surface layer is very dark grayish brown loam about 6 inches thick over 12 inches of dark grayish brown and grayish brown loam that has yellowish brown mottles. The subsoil is light brownish gray clay loam that has common, coarse, distinct dark yellowish brown mottles. It is about 17 inches thick. The substratum extends to a depth of 65 inches or more. It is mixed, light gray, light brownish gray, and brown sandy loam that has a few lenses of loamy sand. In some areas the subsoil and substratum are gleyed or the surface has been covered by as much as 20 inches of fill material.

About 35 percent of this unit is areas of Urban land. In these areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces. Also in these areas the soils have been covered by more than 20 inches of fill material or most or all of the soil profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Baile soils.

Included with this unit in mapping are small areas of soils on foot slopes that are similar to this Baile soil but that are somewhat poorly drained to moderately well drained. Also included are small areas of fill of variable soil material from nearby areas. Included areas make up about 25 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Baile soil has a seasonal high water table at or near the surface from late fall through early spring.

Permeability of the Baile soil is moderately slow or slow. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas and slightly acid or neutral near developed areas.

The Baile soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 500 to 7,000 square feet in size.

This unit has severe limitations for building sites because of potential frost action and the seasonal high water table. Intensive drainage is needed if roads or buildings are constructed. The unit is difficult to drain because ditches or outlets for the excess water are not available.

Recreation developments are severely limited by wetness. This unit also has severe limitations for lawn grasses, ornamental trees, shrubs, and gardens because of wetness.

2B—Beltsville-Keyport complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, moderately well drained Beltsville and Keyport soils. The unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 5 to 80 acres in size. The Beltsville and Keyport soils occur in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 50 percent of this unit is relatively undisturbed Beltsville soil. Typically, the surface layer is very dark grayish loam about 12 inches thick. In the upper part, to a depth of 20 inches, the subsoil is yellowish brown silt loam. In the middle part, to a depth of 24 inches, it is light olive brown silt loam. The lower part, to a depth of 45 inches, it is brownish yellow silt loam that has common medium distinct yellowish brown and light brownish gray mottles and thin lenses of sandy loam. The substratum is mixed yellowish brown and strong brown sandy loam to a depth of 65 inches or more. In some areas the substratum is variegated dark red and light gray silty clay loam or clay loam.

About 30 percent of this unit is relatively undisturbed Keyport soil. Typically, the surface layer is dark brown loam about 4 inches thick. In the upper 8 inches the

subsoil is mixed dark grayish brown and strong brown silty clay loam. In the lower 36 inches it is mixed yellowish red and pale brown clay. Light brownish gray and dark yellowish brown mottles are at a depth of 21 inches. The substratum extends to a depth of 65 inches or more. It is mixed, brownish yellow and light gray clay. In some areas the surface layer is dark gray to yellowish brown silt loam or sandy loam.

Included with this unit in mapping are small areas of similar soils that have a sandy or silty surface layer and an underlying clay layer that perches water. Also included are small areas of urban land and graded, sandy and clayey soils. Included areas make up about 20 percent of the total acreage of the unit, but the actual percentage varies from one area to another.

Permeability of the Beltsville soil is slow or very slow. Available water capacity is moderate. Shrink-swell potential is low. Potential frost action is high. A water table is perched between 18 to 30 inches, above the very dense layer (or fragipan), from late fall through early spring. Reaction is extremely acid to strongly acid in unlimed areas.

Permeability of the Keyport soil is slow or very slow. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is high. A water table is perched at a depth of 18 to 48 inches, above and in the very dense clay layer of the subsoil and substratum, from late fall through early spring. Reaction is extremely acid to strongly acid in unlimed areas.

Most areas of this unit are wooded or are used as open space.

This unit has moderate or severe limitations for building sites because of wetness, slope, and high potential frost action. On the Keyport soil, building sites are also limited by low strength and shrink-swell potential. On the Keyport soil, drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. Foundations and footings need to be designed to prevent the structural damage caused by shrinking and swelling of the soil and by frost action. Cuts or excavations in the Keyport soil are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of cuts onto roads or other surfaces below. The clay, particularly when under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil as well as for potential frost action of the surface material. The upper layer of the Beltsville soil will need to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments have moderate to severe limitations because of slow permeability, wetness, and erosion potential. Playgrounds and other intensive use areas may require special surfacing or relocating to other areas. Unless paths and trails follow the contour of the slope, they are subject to erosion. The soils in this unit are suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas of this unit that are very deeply cut or excavated are generally clayey and extremely acid. In these areas this unit is poorly suited to seeding and landscaping.

2UB—Beltsville-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, moderately well drained Beltsville soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on broad uplands of the Coastal Plain. Most areas are irregular in shape and range from 2 to 80 acres in size. The Beltsville soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Beltsville soil. Typically, the surface layer is very dark grayish loam about 12 inches thick. In the upper part, to a depth of 20 inches, the subsoil is yellowish brown silt loam. In the middle part, to a depth of 24 inches, it is light olive brown silt loam. In the lower part, to a depth of 45 inches, it is brownish yellow silt loam that has common, medium, distinct yellowish brown and light brownish gray mottles and thin lenses of sandy loam. The substratum is mixed yellowish brown and strong brown sandy loam to a depth of 65 inches or more. In some areas the surface layer is silt loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. Also, in some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Beltsville soils.

Included with this unit in mapping are small areas of Keyport, Leonardtown, Mattapex, Matapeake, and Woodstown soils. Also included are small areas of fill from dumping of variable soil materials or grading. Included areas make up 20 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Beltsville soil has a perched water table at a depth of 18 to 30 inches,

above the very dense layer, or fragipan, from late fall through early spring.

Permeability of the Beltsville soil is slow or very slow. Available water capacity is moderate in undisturbed areas and low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

The Beltsville soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 500 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of wetness, slope, and high potential frost action. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. The upper layer of the Beltsville soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments have moderate to severe limitations because of wetness, slow permeability, and erosion potential. Play areas and walkways may require special surfacing. Unless protected, paths and trails are subject to erosion. The soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

2UC—Beltsville-Urban land complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, moderately well drained Beltsville soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on broad uplands of the Coastal Plain. Most areas are irregular in shape and range from 4 to 45 acres in size. The Beltsville soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Beltsville soil. Typically, the surface layer is very dark grayish loam about 12 inches thick. In the upper part, to a depth of 20 inches, the subsoil is yellowish brown silt loam. In the middle part, to a depth of 24 inches, it is light olive brown silt loam. In the lower part, to a depth of 45 inches, it is brownish yellow silt loam that has common medium distinct yellowish brown and light brownish gray mottles and thin lenses of sandy loam. The substratum is mixed yellowish brown and strong brown sandy loam to a depth of 65 inches or more. In some areas the surface layer is silt loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or they are covered by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Beltsville soils.

Included with this unit in mapping are small areas of Mattapex and Matapeake soils. Also included are small areas of fill from dumping variable soil materials or from grading. Included areas make up 20 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Beltsville soil has a perched water table at a depth of 18 to 30 inches, above the very dense layer, or fragipan, from late fall through early spring.

Permeability of the Beltsville soil is slow or very slow. Available water capacity is moderate in undisturbed areas and low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is high. In unlimed areas reaction is extremely acid to strongly acid.

The Beltsville soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas are management units that range from 500 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of wetness, high potential frost action, and slope. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. To control erosion, construction of buildings, roads, and streets can be designed to conform to the natural slope. The upper layer of the Beltsville soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments have moderate or severe limitations because of wetness, slow permeability, the erosion hazard, and slope. Play areas and walkways may require special surfacing. Unless protected, paths and trails are subject to erosion. The Beltsville soil in this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

3UB—Urban land-Beltsville-Keyport complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, moderately well drained Beltsville and Keyport soils and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 2 to 60 acres in size. The Beltsville and Keyport soils and Urban land occur together in such an intricate pattern on the

landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is areas of Urban land. In these areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Beltsville and Keyport soils.

About 30 percent of this unit is relatively undisturbed Beltsville soil. Typically, the surface layer is very dark grayish loam about 12 inches thick. In the upper part, to a depth of 20 inches, the subsoil is yellowish brown silt loam. In the middle part, to a depth of 24 inches, it is light olive brown silt loam. In the lower part, to a depth of 45 inches, it is brownish yellow silt loam that has yellowish brown and light brownish gray mottles and thin lenses of sandy loam. The substratum is mixed yellowish brown and strong brown sandy loam to a depth of 65 inches or more. In some areas the substratum is variegated dark red and light gray silty clay loam or clay loam. In some areas the surface layer is silt loam or sandy loam or the surface has been covered by as much as 20 inches of fill material.

About 20 percent of this unit is the relatively undisturbed Keyport soil. Typically, the surface layer is dark brown loam about 4 inches thick. In the upper 8 inches the subsoil is mixed dark grayish brown and strong brown silty clay loam. In the lower 36 inches it is mixed yellowish red and pale brown clay that has distinct light brownish gray and dark yellowish brown mottles. The substratum is mixed brownish yellow and light gray clay to a depth of 65 inches or more. In some areas the surface layer is dark gray to yellowish brown silt loam or sandy loam or the surface has been covered by as much as 20 inches of fill material.

Included with this unit in mapping are small areas of similar soils that have a sandy or silty surface layer and an underlying clay layer that perches water. Also included are small areas of graded sandy and clayey soils. Included areas make up about 10 percent of the total acreage of the unit, but the actual percentage varies.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas, the Beltsville soil has a perched water table at a depth of 18 to 30 inches, above the very dense layer, or fragipan, from late fall through early spring. In undrained areas the Keyport soil has a perched water table at a depth of 18 to 48 inches, above or in the very dense clay layer of the subsoil and substratum, from late fall to late spring.

Permeability of the Beltsville soil is slow or very slow. Available water capacity is moderate in undisturbed areas and low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

Permeability of the Keyport soil is slow or very slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is high. Reaction is extremely acid or very strongly acid in unlimed areas.

The Beltsville and Keyport soils in the open parts of the map unit are used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 500 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of wetness, slope, and high potential frost action. On the Keyport soil, building sites are also limited by low strength and shrink-swell potential. Also on the Keyport soil, drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the soil and by frost action. Cuts or excavations in the Keyport soil are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of cuts onto roads or other surfaces below. The clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil as well as the potential frost action of the surface material. The upper layer of the Beltsville soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments have moderate or severe limitations because of slow permeability, wetness, and the erosion hazard. Playgrounds and other intensive uses may require special surfacing or need to be located in other areas. Unless protected, paths and trails are subject to erosion. The soils in this unit are suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas of this unit that are very deeply cut or excavated are generally clayey and extremely acid. Under these conditions, this unit has poor potential for seeding and landscaping.

4UB—Urban land-Beltsville complex, 0 to 8 percent slopes

This map unit consists of areas of Urban land and the moderately well drained Beltsville soil. It is in poorly defined drainageways of broad uplands of the Coastal Plain that have been altered by grading for housing developments, shopping centers, industrial areas, and

similar uses. Most areas are irregularly shaped and range from 45 to 190 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Beltsville soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In these areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is the relatively undisturbed Beltsville soil. Typically, the surface layer is very dark grayish loam about 12 inches thick. In the upper part, to a depth of 20 inches, the subsoil is yellowish brown silt loam. In the middle part, to a depth of 24 inches, it is light olive brown silt loam. In the lower part, to a depth of 45 inches, it is brownish yellow silt loam that has common medium distinct yellowish brown and light brownish gray mottles and thin lenses of sandy loam. The substratum is mixed yellowish brown and strong brown sandy loam to a depth of 65 inches or more. In some areas the surface layer is silt loam.

Included with this unit in mapping are small areas of Leonardtown, Mattapex, and Woodstown soils. Also included are small areas of fill from dumping of variable soil materials or grading. Included areas make up 15 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Beltsville soil has a perched water table at a depth of 18 to 30 inches above the very dense layer, or fragipan, from late fall through early spring.

Permeability of the Beltsville soil is slow or very slow. Available water capacity is moderate in undisturbed areas and low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water capacity is low or very low.

The Beltsville soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. The size of these areas is generally less than 500 square feet.

This unit has moderate or severe limitations for building sites because of location and size of open space, slope, wetness, and potential frost action. Most buildings were erected on sites of razed old buildings. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. The upper layer of the Beltsville soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments have moderate or severe limitations because of slow permeability, the erosion hazard, and shortage of open space. Most areas of the Beltsville soil are also subject to heavy foot traffic and the shade of tall buildings during the day. Because of these limitations, the soil of this unit is poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Landscaped areas require shade-tolerant lawn grasses and plants.

5E—Brandywine loam, 15 to 60 percent slopes

This moderately steep to steep, somewhat excessively drained soil is on upland side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is dark brown loam about 6 inches thick. The subsoil is yellowish brown sandy loam about 13 inches thick. The substratum is yellowish brown very gravelly loamy sand over dark yellowish brown extremely gravelly coarse sand. It extends to a depth of more than 65 inches. In some areas the surface layer is sandy loam or gravelly loam.

Included with this unit in mapping are small areas of Manor soils and soils that are similar to the Brandywine soil but that are moderately deep to hard rock. Also included are small areas of rock outcrop, urban land, and fill from dumping of variable soil material or grading. Included areas make up 10 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability of the Brandywine soil is moderately rapid. Available water capacity is low. Shrink-swell potential is low. Potential frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

Most areas of this unit are used for open space, parks, lawns, and gardens.

This soil has severe limitations for building sites because of caving cutbanks and slope. Extensive cutting and filling are generally required. Cutbanks are subject to excessive erosion. Intensive measures to control runoff are needed.

Recreation developments are severely limited by slope. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by constructing paths and trails to follow the contour of the slope. This soil has poor potential for lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens because of slope and low available water capacity. Areas

that are very deeply cut or excavated are generally very gravelly and droughty.

6B—Chester loam, 0 to 8 percent slopes

This nearly level to gently sloping, well drained soil is on broad ridges and side slopes on uplands of the Piedmont Plateau. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 20 acres in size.

Typically, the surface layer is very dark grayish brown loam about 2 inches thick. The subsurface layer is dark yellowish brown loam about 6 inches thick. The subsoil is strong brown clay loam over loam. It is about 30 inches thick. The substratum is mixed brownish yellow, light yellowish brown, and yellowish brown loam to a depth of 65 inches or more. In some areas the surface layer is silt loam.

Included with this unit in mapping are small areas of soils that are similar to this Chester soil but that are moderately deep or deep to bedrock or that have more clay and redder colors in the subsoil. Also included are small areas of urban land and fill of variable soil material from nearby areas or grading. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Chester soil is moderate. The available water capacity is moderate. Shrink-swell potential is low. Potential frost action is moderate. Reaction is very strongly acid or strongly acid in unlimed areas.

Most areas of this unit are used as open space, parks, and undeveloped land for building sites.

This soil has few limitations for building sites. Using suitable base material for roads helps to prevent damage from low strength.

This soil has few limitations for recreation developments. Grading is needed for some playgrounds on the more sloping areas of the unit. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

6UB—Chester-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Chester soil and Urban land. Urban land is areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on broad ridges and side slopes on uplands of the Piedmont Plateau. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 200 acres in size. The Chester soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 55 percent of this unit is relatively undisturbed Chester soil. Typically, the surface layer is very dark grayish brown loam about 2 inches thick. The subsurface layer is dark yellowish brown loam about 6 inches thick. The subsoil is strong brown clay loam over loam. It is about 30 inches thick. The substratum is mixed brownish yellow, light yellowish brown, and yellowish brown loam to a depth of 65 inches or more. In some areas the surface layer is silt loam or the surface has been covered by as much as 20 inches of fill material.

About 25 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Chester soils.

Included with this unit in mapping are small areas of soils that are similar to the Chester soil but that are moderately deep or deep to bedrock or that have more clay and redder colors in the subsoil. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Chester soil is moderate. The available water capacity is moderate in undisturbed areas and moderate to low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is very strongly acid or strongly acid in unlimed areas.

The Chester soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 500 to 7,000 square feet in size.

This unit has few limitations for building sites. Using suitable base material for roads will help to prevent damage from low strength.

This unit has few limitations for recreation developments. Shortage of open space and slope will limit possible areas for playgrounds. The Chester soil in this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

7UB—Christiana-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Christiana soil and Urban land. Urban land is areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on broad ridges and side slopes of the Coastal Plain. Most areas are irregular in shape and range from 2

to 60 acres in size. The Christiana soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Christiana soil. Typically, the surface layer is very dark brown loam about 3 inches thick. The subsurface layer is yellowish red silt loam about 8 inches thick. In the upper 16 inches the subsoil is red clay loam. In the next 19 inches it is red and strong brown clay. In the lower 10 inches it is yellowish red clay. The substratum is yellowish red and strong brown silty clay to a depth of 65 inches or more. In some areas the surface layer is silt loam or sandy loam or the surface been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or the surface has been covered by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Christiana soil.

Included with this unit in mapping are small areas of Keyport and Sunnyside soils. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Christiana soil is moderately slow or slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

The Christiana soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate limitations for building sites because of low strength, clayey texture, the moderate shrink-swell potential, and slope. Cuts or excavations in this unit are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of the cuts onto roads or other areas below. The clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for low strength and instability of the clayey soil (fig. 6).

Recreation developments have moderate limitations because of slope and moderately slow or slow permeability. Areas that have clay and silty clay surface textures need special surfacing for play areas and walkways. The Christiana soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

7UC—Christiana-Urban land complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, well drained Christiana soil and Urban land. Urban land has been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on side slopes of the Coastal Plain. Most areas are irregular in shape and range from 2 to 30 acres in size. The Christiana soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 45 percent of this unit is relatively undisturbed Christiana soil. Typically, the surface layer is very dark brown loam about 3 inches thick. The subsurface layer is yellowish red silt loam about 8 inches thick. In the upper 16 inches the subsoil is red clay loam. In the next 19 inches it is red and strong brown clay. In the lower 10 inches it is yellowish red clay. The substratum to a depth of 65 inches or more is yellowish red and strong brown silty clay. In some areas the surface layer is silt loam, clay loam, clay, or silty clay or the surface has been covered by as much as 20 inches of fill material.

About 45 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Christiana soils.

Included with this unit in mapping are small areas of Sunnyside soils. Also included are small areas of soils similar to this Christiana soil but that have slopes of less than 8 percent or more than 15 percent. Included areas make up about 10 percent of the total acreage of the unit.

Permeability of the Christiana soil is moderately slow or slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

The Christiana soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope, clayey texture, low strength, and shrink-swell potential. Cutbanks or excavations in this unit are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of the cuts onto roads or other areas below. The clay, particularly when under pressure or load, can squeeze out from under building

Figure 6.—This retaining wall is susceptible to movement because of the high clay content and shrink-swell potential of Christiana-Urban land complex, 0 to 8 percent slopes.

foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for low strength and instability of the clayey soil.

Recreation developments have moderate or severe limitations because of slope. Careful grading of slope and diversion of runoff are needed around heavy use areas to protect the soil from slumping or gully erosion. Areas that have a clay and silty clay surface layer need special surfacing for play areas and walkways. The soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs but is limited by slope. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

8UB—Urban land-Christiana complex, 0 to 8 percent slopes

This map unit consists of areas of Urban land and the well drained Christiana soil. It is on uplands of the Coastal Plain that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 2 to 30 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Christiana soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Christiana soil. Typically, the surface layer is very dark brown loam about 3 inches thick. The subsurface layer is yellowish red silt loam about 8 inches thick. In the upper 16 inches the subsoil is red clay loam. In the next 19 inches it is red and strong brown clay. In the lower 10 inches it is yellowish red clay. The substratum is yellowish red and strong brown silty clay to a depth of 65 inches or more. In some areas the surface layer is silt loam or sandy loam.

Included with this unit in mapping are small areas of Keyport and Sunnyside soils or gravelly fill material. Also included are small areas of fill that consists of building rubbish, cinders, incinerator ash, and other nonsoil waste material. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability of the Christiana soil is moderately slow or slow. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water capacity is low or very low.

The Christiana soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. The size of these areas is generally less than 500 square feet.

This unit has moderate limitations for building sites because of low strength, clay layers, slope, and shrink-swell potential. Shortage of open space limits most building activity to sites where old buildings have been razed. Cuts or excavations in this unit are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below. Because of instability and low strength, the clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil.

Recreation developments are severely limited by shortages of open space, slope, and slow permeability. The soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs. It is limited by lack of open space and by partial shade. Landscaped areas require shade-tolerant lawn grasses and plants.

9UB—Elkton-Urban land complex, 0 to 5 percent slopes

This map unit consists of nearly level to gently sloping, poorly drained Elkton soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on upland flats and depressions of the Coastal Plain. Areas are irregular in shape and range from 3 to 15 acres in size. The Elkton soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Elkton soil. Typically, the surface layer is very dark gray silt loam about 5 inches thick. The subsurface is brown silty clay loam about 9 inches thick. It has light gray and dark reddish brown mottles. The subsoil is light brownish gray silty clay about 18 inches thick. It has light gray and dark reddish brown mottles. The substratum to a depth of 65 inches is light brownish gray silty clay loam that has light gray and dark reddish brown mottles over olive gray silty clay that has light brownish gray mottles. It is gray very fine sandy loam to a depth of 70 inches. In some areas the surface layer is loam or silty clay loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away.

Included with this unit in mapping are small areas of Keyport soils. Also included are small areas of fill of variable soil material from nearby areas. Included areas make up about 20 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas Elkton soils have a water table that is at or near the surface from late fall to late spring.

Permeability of the Elkton soil is slow. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid to strongly acid in unlimed areas.

The Elkton soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This soil has severe limitations for building sites because of wetness and low strength. Intensive drainage is needed if roads or buildings are constructed. The unit is difficult to drain because ditches or outlets for the excess water are not available.

Recreation developments are severely limited by wetness and slow permeability. Because of wetness, this soil is poorly suited to lawn grasses, ornamental trees, shrubs, and gardens.

10—Fluvents, frequently flooded

These nearly level soils occur in long, narrow strips along flood plains and are about 2 to 90 acres in size. They consist of soil material that has recently been washed from uplands and deposited on flood plains. This soil material is unconsolidated, stratified alluvium. It varies in drainage over short distances. Its texture generally ranges from extremely gravelly to stony sand, loamy sand, sandy loam, or fine sandy loam. These soils are subject to frequent changes because of stream overflow. In most areas they are flooded at least twice a year.

Included with these soils in mapping are small areas of moderately well drained to somewhat poorly drained loamy and silty soils. Also included are areas of soils that are bouldery or that contain as much as 20 inches of

miscellaneous fill. Included areas make up about 15 percent of the mapped acreage.

A large part of this complex is wooded; other areas are so gravelly or sandy that they support little or no vegetation. These soils are subject to frequent flooding and are poorly suited to most uses. They are suitable as habitat for some kinds of wetland wildlife. These soils are natural areas within a densely populated area.

11B—Galestown loamy sand, 0 to 8 percent slopes

This nearly level to gently sloping, somewhat excessively drained soil is on uplands of the Coastal Plain. Most areas of this soil are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is dark brown loamy sand about 7 inches thick. The subsurface layer is yellowish brown loamy sand about 16 inches thick. In the upper 5 inches the subsoil is yellowish brown loamy sand. In the lower 22 inches it consists of alternating layers of strong brown loamy sand and yellowish brown sand. The substratum to a depth of 65 inches or more is yellowish brown sand. In some areas lenses that are 5 to 20 percent fine gravel are scattered throughout.

Included with this unit in mapping are areas of moderately well drained soils and soils that are similar to the Galestown soil but that have a clay substratum. Also included are areas of soils that have slopes of more than 8 percent. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Galestown series is rapid. Available water holding capacity is low. Shrink-swell potential is low. Potential for frost action is low. Reaction is extremely acid to strongly acid.

Most areas of this unit are used as open space, lawns, gardens, and woodlands.

This unit has severe and moderate limitations for building sites because of slope and caving cutbanks. Sloped banks or shoring will prevent cutbanks of excavations from caving in. To control surface erosion, construction of buildings, roads, and streets can be designed to conform to the natural slope. The soil material from this unit is a good source of sand and roadfill material.

Recreation developments have moderate limitations because of slope and small stones. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Because of slope, low available water capacity, and the sandy surface layer, this soil has limited potential for lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated are generally very sandy and droughty. These areas may require irrigation if they are used for vegetable gardens or landscaping.

11UB—Galestown-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, excessively drained Galestown soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 2 to 25 acres in size. The Galestown soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Galestown soil. Typically, the surface layer is dark brown loamy sand about 7 inches thick. The subsurface layer is yellowish brown loamy sand about 16 inches thick. In the upper 5 inches the subsoil is yellowish brown loamy sand. In the lower 22 inches it consists of alternating layers of strong brown loamy sand and yellowish brown sand. The substratum to a depth of 65 inches or more is yellowish brown sand. In some areas lenses that are 5 to 20 percent fine gravel are scattered throughout.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Galestown soils.

Included with this unit in mapping are areas of moderately well drained soils and soils that are similar to the Galestown soil but that have a clay substratum. Also included are areas of soils that have slopes of more than 8 percent. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Galestown soil is rapid. Available water holding capacity is low. Shrink-swell potential is low. Potential for frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

The Galestown soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 500 to 7,000 square feet in size.

This unit has severe and moderate limitations for building sites because of slope and caving cutbanks. Sloped banks or shoring will prevent cutbanks of excavations from caving in. To control erosion, construction of buildings, roads, and streets can be

designed to conform to the natural slope. The soil material from this unit is a good source of sand and roadfill material.

Recreation developments have moderate limitations because of slope and small stones. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Because of slope, low available water capacity, and the sandy surface layer, the soil in this unit has limited potential for lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated are generally very sandy and droughty. These areas may require irrigation if they are used for vegetable gardens or landscaping.

12A—Jackland silt loam, 0 to 3 percent slopes

This nearly level, moderately well drained and somewhat poorly drained soil is on upland flats, foot slopes, and depressions of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil in the upper part is brown clay about 21 inches thick. It has many yellowish brown and grayish brown mottles. In the lower part it is brown clay about 22 inches thick. It has many light gray and strong brown mottles. The substratum to a depth of at least 65 inches is dark yellowish brown clay loam that has many prominent gray mottles.

Included with this unit in mapping are small areas of Legore soils and soils that are similar to this Jackland soil but that are on slopes of more than 3 percent. Also included are soils similar to the Legore soil but that are moderately well drained and fill from dumping of variable soil material or from grading. Included areas make up about 20 percent of the total acreage of the unit, but the actual percentage varies from one area to another.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Jackland soil has a water table perched at a depth of 12 to 24 inches above the clayey Bt layer from winter through early spring.

Permeability of the Jackland soil is very slow. Available water capacity is moderate. Shrink-swell potential is moderate. Potential frost action is high. Reaction is very strongly acid to moderately alkaline in unlimed areas.

Most areas of this unit are used for open space, parks, golf courses, building sites, lawns, and gardens.

This soil has severe limitations for building sites because of wetness and shrink-swell potential. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. Foundations and footings need to be designed to prevent the structural damage caused by shrinking and swelling of the soil. For local roads and streets, the upper layer of the Jackland soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action, shrinking and swelling, and low strength.

Recreation developments have severe limitations because of wetness and slow permeability. Play areas and walkways may require special surfacing. This soil has moderate limitations because of wetness for lawn grasses, flowers, vegetables, trees, and shrubs.

12B—Jackland silt loam, 3 to 8 percent slopes

This gently sloping, moderately well drained and somewhat poorly drained soil is on upland flats, foot slopes, and drainageways of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 90 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil in the upper part is brown clay about 21 inches thick. It has many yellowish brown and grayish brown mottles. In the lower part it is brown clay about 22 inches thick. It has many light gray and strong brown mottles. The substratum to a depth of at least 65 inches is dark yellowish brown clay loam that has many gray mottles.

Included with this unit in mapping are small areas of Legore soils and soils similar to the Legore soil but that are moderately well drained. Also included are areas of fill from dumping of variable soil materials or grading. Included areas make up 20 percent of the total acreage of the unit. The percentage varies from one area to another.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Jackland soil has a water table perched at a depth of 12 to 24 inches above the clayey layer from winter through early spring.

Permeability of the Jackland soil is very slow. Available water capacity is moderate. Shrink-swell potential is moderate. Potential frost action is high. Reaction is very strongly acid to moderately alkaline in unlimed areas.

Most areas of this unit are used for open space, parks, golf courses, building sites, lawns, and gardens.

This soil has severe limitations for building sites because of wetness and shrinking and swelling. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the soil. The upper layer of the Jackland soil needs to be replaced or covered with a suitable base material to help

reduce damage from frost action, shrinking and swelling, and low strength on local roads and streets.

Recreational developments have severe limitations because of wetness and slow permeability. Play areas and walkways may require special surfacing. This soil has moderate limitations because of wetness for lawn grasses, flowers, vegetables, trees, and shrubs.

12UB—Jackland-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, moderately well drained and somewhat poorly drained Jackland soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on upland flats, foot slopes, and drainageways of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 500 acres in size. The Jackland soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Jackland soil. Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. In the upper part the subsoil is brown clay about 21 inches thick. It has many yellowish brown and grayish brown mottles. In the lower part it is brown clay about 22 inches thick. It has many light gray and strong brown mottles. The substratum to a depth of at least 65 inches is dark yellowish brown clay loam that has many prominent gray mottles. In some areas the surface layer is loam or stony silt loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of Jackland soils that have been cut and graded.

Included with this unit in mapping are small areas of Legore soils. Also included are small areas of soils that are similar to this Jackland soil but that have a weak, discontinuous fragipan. Also included are soils that are similar to this Jackland soil but that are on slopes of more than 8 percent and soils that are similar to the Legore soil but that are moderately well drained. Included areas make up about 20 percent of the total acreage.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Jackland soil has a water table perched at a depth of 12 to 24 inches above the clayey layer from winter through early spring.

Permeability of the Jackland soil is very slow. Available water capacity is moderate in undisturbed areas and low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is high. Reaction is very strongly acid to moderately alkaline in unlimed areas.

The Jackland soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has severe limitations for building sites because of wetness and shrinking and swelling. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the soil. The upper layer of the Jackland soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action, shrinking and swelling, and low strength on local roads and streets.

Recreational developments have severe limitations because of seasonal wetness and slow permeability. Play areas and walkways may require special surfacing. Wetness is a moderate limitation for lawn grasses, flowers, vegetables, trees, and shrubs.

13B—Joppa gravelly sandy loam, 0 to 8 percent slopes

This nearly level to gently sloping, somewhat excessively drained soil is at high elevations on level uplands, ridges, and side slopes of the Coastal Plain. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 35 acres in size.

Typically, the surface layer is very dark grayish brown over dark brown gravelly sandy loam. It is about 10 inches thick. The subsurface layer is yellowish brown very gravelly sandy loam about 6 inches thick. The subsoil is strong brown very gravelly sandy loam about 8 inches thick. The substratum to a depth of 65 inches or more is stratified, reddish yellow very gravelly sand, gravelly loamy sand, and gravelly sandy loam.

Included with this unit in mapping are small areas of Galestown and Sassafras soils and soils that are similar to this Joppa soil but that have a silty surface layer 5 to 20 inches thick or that overlie ironstone and gneiss saprolite. Also included are areas of urban land and fill from dumping of variable soil materials or grading. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Joppa soil is moderately rapid. Available water capacity is low. Shrink-swell potential is low. Potential frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

This unit is used for open space, potential building sites, playgrounds, lawns, and gardens.

This unit has few limitations for building sites. Loose gravel is generally a limitation for shallow excavations for basements and other purposes, but is not difficult to remove. Sloped banks or shoring will prevent cutbanks of excavations from caving in.

Recreation developments are limited to areas with adequate space and without small stones in the surface material. Because of low available water capacity and a gravelly surface layer, the Joppa soil has moderate limitations for lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated are generally very gravelly and droughty.

13C—Joppa gravelly sandy loam, 8 to 15 percent slopes

This moderately sloping, somewhat excessively drained soil is at high elevations on side slopes of the Coastal Plain. Most areas are irregular in shape and range from 2 to 35 acres in size.

Typically, the surface layer is very dark grayish brown over dark brown gravelly sandy loam. It is about 10 inches thick. The subsurface layer is yellowish brown very gravelly sandy loam about 6 inches thick. The subsoil is strong brown very gravelly sandy loam about 8 inches thick. The substratum to a depth of 65 inches or more is stratified, reddish yellow very gravelly sand, gravelly loamy sand, and gravelly sandy loam.

Included with this unit in mapping are small areas of Galestown and Sassafras soils and soils that are similar to this Joppa soil but that have a silty surface layer 5 to 20 inches thick or that overlie ironstone and gneiss saprolite. Also included are small areas on steeper slopes and areas of urban land and fill from dumping of variable soil materials or grading. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Joppa soil is moderately rapid. Available water capacity is low. Shrink-swell potential is low. Potential frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

This unit is used for open space, potential building sites, playgrounds, lawns, and gardens.

This unit has moderate or severe limitations for building sites because of caving cutbanks and slope. Loose gravel is generally a limitation for shallow excavations for basements and other purposes, but is not difficult to remove. Sloped banks or shoring prevents cutbanks of excavations from caving in. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion.

Recreational developments are limited by slope, small stones, and lack of open space. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by paths and trails following the contour of the slope. Because of slope, low available water capacity, and the gravelly surface layer, the Joppa soil has moderate limitations for lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated are generally very gravelly and droughty.

13E—Joppa gravelly sandy loam, 15 to 60 percent slopes

This strongly sloping to steep, somewhat excessively drained soil is at high elevations in dissected uplands of the Coastal Plain. Most areas are irregular in shape and range from 4 to 20 acres in size.

Typically, the surface layer is very dark grayish brown over dark brown gravelly sandy loam. It is about 10 inches thick. The subsurface layer is yellowish brown very gravelly sandy loam about 6 inches thick. The subsoil is strong brown very gravelly sandy loam about 8 inches thick. The substratum to a depth of 65 inches or more is stratified, reddish yellow very gravelly sand, gravelly loamy sand, and gravelly sandy loam.

Included with this unit in mapping are small areas of Galestown and Sassafras soils and soils that are similar to this Joppa soil but that have very gravelly and extremely gravelly surface textures or that overlie ironstone and gneiss saprolite. Also included are areas of urban land and fill from dumping of variable soil materials or grading. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Joppa soil is moderately rapid. Available water capacity is low. Shrink-swell potential is low. Potential frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

This unit is used for open space, potential building sites, lawns, and gardens.

This unit has severe limitations for building sites because of caving cutbanks and slope. Extensive cutting and filling are generally required. Cutbanks cave and are subject to excessive erosion. Intensive measures are needed to control runoff.

Recreation developments have severe limitations because of slope, small stones, and lack of open space. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Because of slope, low available water capacity, and the gravelly surface

layer, the soil of this unit is poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated are generally very gravelly and droughty.

13UB—Joppa-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, somewhat excessively drained Joppa soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is at high elevations on level uplands, ridges, and side slopes of the Coastal Plain. Most areas are irregular in shape and range from 2 to 135 acres in size. The Joppa soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 45 percent of this unit is relatively undisturbed Joppa soil. Typically, the surface layer is very dark grayish brown over dark brown gravelly sandy loam. It is about 10 inches thick. The subsurface layer is yellowish brown very gravelly sandy loam about 6 inches thick. The subsoil is strong brown very gravelly sandy loam about 8 inches thick. The substratum to a depth of 65 inches or more is stratified reddish yellow very gravelly sand, gravelly loamy sand, and gravelly sandy loam. In some areas the surface layer is sandy loam or gravelly loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut or graded Joppa soils.

Included with this unit in mapping are small areas of soils that are similar to this Joppa soil but that have a silty surface layer 5 to 20 inches thick or that are gravelly, very gravelly, or sandy throughout. Also included are areas of soils that are similar to this Joppa soil but that overlie ironstone and gneiss saprolite on the Homewood campus of the Johns Hopkins University and bordering the streams of Herring Run and Chinquapin Run near Morgan State University. Included areas make up about 15 percent of the total acreage of the unit.

Permeability of the Joppa soil is moderately rapid. Available water capacity is low in undisturbed areas and low or very low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

The Joppa soil in the open part of the map unit is used for open space, potential building sites, playgrounds, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This unit has few limitations for building sites. Loose gravel is generally a limitation for shallow excavations for basements and other purposes, but is not difficult to remove. Sloped banks or shoring will prevent cutbanks of excavations from caving in.

Recreation developments are limited to areas with adequate space and without small stones in the surface material. Because of low available water capacity and the gravelly surface layer, the Joppa soil has moderate limitations for lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated are generally very gravelly and droughty.

13UC—Joppa-Urban land complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, somewhat excessively drained Joppa soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is at high elevations on side slopes of the Coastal Plain. Areas are irregular in shape and range from 2 to 140 acres in size. The Joppa soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 45 percent of this unit is relatively undisturbed Joppa soil. Typically, the surface layer is very dark grayish brown over dark brown gravelly sandy loam. It is about 10 inches thick. The subsurface layer is yellowish brown very gravelly sandy loam about 6 inches thick. The subsoil is strong brown very gravelly sandy loam about 8 inches thick. The substratum to a depth of 65 inches or more is stratified reddish yellow very gravelly sand, gravelly loamy sand, and gravelly sandy loam. In some areas the surface layer is sandy loam or gravelly loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of Joppa soils that have been cut or graded.

Included with this unit in mapping are small areas of soils that are similar to this Joppa soil but that have a silty surface layer 5 to 20 inches thick or that are gravelly, very gravelly, or sandy throughout. Also included are areas of soils that are similar to this Joppa soil but that overlie

ironstone and gneiss saprolite; these areas are on the Homewood campus of the Johns Hopkins University and border the streams of Herring Run and Chinquapin Run near Morgan State University. Included areas make up about 15 percent of the total acreage of the unit.

Permeability of the Joppa soil is moderately rapid. Available water capacity is low in undisturbed areas and low or very low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

The Joppa soil in the open part of the map unit is used for open space, potential building sites, playgrounds, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of caving cutbanks and slope. Loose gravel is generally a limitation for shallow excavations for basements and other purposes, but is not difficult to remove. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Designing buildings, roads, and streets to conform to the natural slope helps to prevent erosion.

Recreation developments are limited by slope, small stones, and lack of open space. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by paths and trails following the contour of the slope. Because of slope, low available water capacity, and the gravelly surface layer, the Joppa soil has a moderate limitation for lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated are generally very gravelly and droughty.

14UB—Urban land-Joppa complex, 0 to 8 percent slopes

This map unit consists of Urban land and the somewhat excessively drained Joppa soil. It is on uplands of the Coastal Plain that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 3 to 100 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Joppa soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In these areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Joppa soil. Typically, the surface layer is very dark grayish brown over dark brown gravelly sandy loam. It is about 10 inches thick. The subsurface layer is yellowish brown very gravelly sandy loam about 6 inches thick. The subsoil is strong brown very gravelly sandy loam about 8 inches thick. The substratum to a depth of 65 inches or more is stratified reddish yellow very gravelly sand, gravelly loamy sand, and gravelly sandy loam. In some areas the surface layer is sandy loam or gravelly loam.

Included with this unit in mapping are small areas of Sunnyside soils, gravelly Sassafras soils, and cut and fill areas that have very gravelly or sandy textures throughout the profile. Included areas make up about 15 percent of the total acreage of the unit, but the percentage varies from one area to another.

Permeability of the Joppa soil is moderately rapid. Available water capacity is low in undisturbed areas and low or very low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water capacity is low or very low.

The Joppa soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This unit has few limitations for building sites. However, lack of open space limits most building activity to sites of razed old buildings. Loose gravel is generally a limitation for shallow excavations for basements and other purposes, but it is not difficult to remove. Sloped banks or shoring will prevent cutbanks of excavations from caving in.

Recreation developments are limited by lack of open space and small stones in the surface material. Because of low available water capacity, the gravelly surface layer, and the shade of tall buildings during the day, the Joppa soil is poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated are generally very gravelly and droughty. Landscaped areas require shade-tolerant and drought-resistant lawn grasses and plants.

15B—Keyport loam, 0 to 8 percent slopes

This nearly level to gently sloping, moderately well drained soil is on upland foot slopes of the Coastal Plain. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is dark brown loam about 4 inches thick. In the upper 8 inches the subsoil is mixed dark grayish brown and strong brown silty clay loam. In

the lower 36 inches it is mixed yellowish red and pale brown clay that has distinct light brownish gray and dark yellowish brown mottles at a depth of 21 inches. The substratum to a depth of 65 inches or more is mixed brownish yellow and light gray clay. In some areas the surface layer is silt loam or sandy loam.

Included with this unit in mapping are small areas of Beltsville, Christiana, Elkton, Sassafras, and Sunnyside soils. Also included are small areas of urban land or fill of variable soil material from nearby areas or grading. Included areas make up about 15 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Keyport soil has a water table perched at a depth of 18 to 48 inches, above or in the very dense clay layer of the subsoil and substratum, from late fall through late spring.

Permeability of the Keyport soil is slow or very slow. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

Most areas of this unit are used for parks, open space, lawns, gardens, and potential building sites.

This unit has moderate or severe limitations for building sites because of wetness, shrinking and swelling, potential frost action, low strength, and slope. Drainage systems are needed for construction of basement and crawl spaces under dwellings or small buildings. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the soil and frost action. Cuts or excavations in this unit are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below. The clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil, as well as for potential frost action of the surface material.

Recreation developments have severe limitations because of slow permeability and wetness. Playgrounds and other intensive uses need to be located in other areas. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated are generally clayey and extremely acid. Under these conditions, this unit would not be suited to seeding and landscaping.

15UB—Keyport-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, moderately well drained Keyport soil and Urban land. Urban land is areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on upland foot slopes of the Coastal Plain. Most areas are irregular in shape and range from 2 to 140 acres in size. The Keyport soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Keyport soil. Typically, the surface layer is dark brown loam about 4 inches thick. In the upper 8 inches the subsoil is mixed dark grayish brown and strong brown silty clay loam. In the lower 36 inches it is mixed yellowish red and pale brown clay that has distinct light brownish gray and dark yellowish brown mottles at a depth of 21 inches. The substratum to a depth of 65 inches or more is mixed brownish yellow and light gray clay. In some areas the surface layer is silt loam or sandy loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of Keyport soils that have been cut and graded.

Included with this unit in mapping are small areas of Beltsville, Christiana, Elkton, Sassafras, and Sunnyside soils. Included areas make up about 20 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Keyport soil has a water table at a depth of 18 to 48 inches, above and in the very dense clay layer of the subsoil and substratum, from late fall through late spring.

Permeability of the Keyport soil is slow or very slow. Available water capacity is high in undisturbed areas and moderate to low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

The Keyport soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of wetness, shrinking and swelling, potential frost action, low strength, and slope. Drainage systems are needed for construction of basement and crawl spaces under dwellings or small buildings. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the

soil and frost action. Cuts or excavations in this unit are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below. The clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil and for potential frost action of the surface material.

Recreation developments have severe limitations because of slow permeability, wetness, and limited open space. Playgrounds and other intensive uses need to be located in other areas. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated are generally clayey and extremely acid. Under these conditions, this unit is not suited to seeding and landscaping.

16UB—Urban land-Keyport complex, 0 to 8 percent slopes

This map unit consists of areas of Urban land and the moderately well drained Keyport soil. It is in depressions and at low elevations of uplands of the Coastal Plain that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 10 to 80 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Keyport soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Keyport soil. Typically, the surface layer is dark brown loam about 4 inches thick. In the upper 8 inches the subsoil is mixed dark grayish brown and strong brown silty clay loam. In the lower 36 inches it is yellowish red and pale brown clay that has distinct light brownish gray and dark yellowish brown mottles at a depth of 21 inches. The substratum to a depth of 65 inches or more is mixed brownish yellow and light gray clay. In some areas the surface layer is silty clay loam.

Included with this unit in mapping are small areas of Christiana, Elkton, and Sunnyside soils. Also included are small areas of severely eroded Keyport soils that have gray clayey material exposed at the surface and areas of cuts and fills that have predominantly clayey soil. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Keyport soil has a perched water table at a depth of 18 to 48 inches in and above the very dense clay layer from late fall through late spring.

Permeability of the Keyport soil is slow or very slow. Available water capacity is high in undisturbed areas and low or very low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water capacity is low or very low.

The Keyport soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This unit has moderate or severe limitations for building sites because of wetness, shrinking and swelling, potential frost action, location and size of open space, low strength, and slope. Most building activity is on sites where old buildings have been razed. Drainage systems are needed for construction of basements and crawl space under dwellings and small buildings. Cutbanks or excavations in this unit are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below. The clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil and for the potential frost action of the surface material.

Recreation developments have severe limitations because of wetness, lack of open space, and slow permeability. Most areas of the soils in this unit are also subject to heavy foot traffic and the shade of tall buildings. Because of these limitations, the soil of this unit is poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Landscaped areas require shade-tolerant lawn grasses and plants.

17B—Legore loam, 0 to 8 percent slopes

This nearly level to gently sloping, well drained soil is on broad ridges and side slopes of the Piedmont Plateau. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 35 acres in size.

Typically, the surface layer is covered with a ½-inch mat of decomposed leaves and twigs. It is very dark grayish brown loam about 4 inches thick. The subsurface

layer is dark yellowish brown loam about 8 inches thick. The subsoil is strong brown clay loam about 10 inches thick. In the upper part the substratum is strong brown loam about 33 inches thick. In the lower part it is dark brown loam to a depth of 65 inches or more. In some areas the surface layer is silt loam.

Included with this unit in mapping are small areas of Montalto soils. Also included are small areas of fill of variable soil material from adjacent areas and severely eroded Legore soils that have a surface layer of clay loam and gravelly clay loam. Included areas make up about 15 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. Available water capacity is moderate. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks or home site development.

This soil has few limitations for building sites. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope and small stones. Play areas and walkways may require special surfacing. Unless protected, paths and trails are subject to erosion. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

17C—Legore loam, 8 to 15 percent slopes

This moderately sloping, well drained soil is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is covered with a 1/2-inch mat of decomposed leaves and twigs. It is very dark grayish brown loam about 4 inches thick. The subsurface layer is dark yellowish brown loam about 8 inches thick. The subsoil is strong brown clay loam about 10 inches thick. In the upper part the substratum is strong brown loam about 33 inches thick. In the lower part it is dark brown loam to a depth of 65 inches. In some areas the surface layer is silt loam.

Included with this unit in mapping are small areas of Montalto soils. Also included are small areas of fill of variable soil material from adjacent areas, severely eroded Legore soils that have a surface layer of clay loam and gravelly clay, and soils that are similar to this Legore soil but that have slopes of more than 15 percent. Included areas make up about 15 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. Available water capacity is moderate. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks and home site developments.

This soil has moderate or severe limitations for building sites because of slope. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments have moderate or severe limitations because of slope. Play areas and walkways may require grading and special surfacing. Erosion and sedimentation can be controlled by maintaining an adequate plant cover and by paths and trails following the contour of the slope. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

17E—Legore loam, 15 to 45 percent slopes

This strongly sloping to steep, well drained soil is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 4 to 70 acres in size.

Typically, the surface layer is covered with a 1/2-inch mat of decomposed leaves and twigs. It is very dark grayish brown loam about 4 inches thick. The subsurface layer is dark yellowish brown loam about 8 inches thick. The subsoil is strong brown clay loam about 10 inches thick. The upper part of the substratum is strong brown loam about 33 inches thick. The lower part is dark brown loam to a depth of 65 inches or more. In some areas the surface layer is silt loam.

Included with this unit in mapping are small areas of fill of variable soil material from adjacent areas, severely eroded Legore soils that have a surface layer of clay loam and gravelly clay loam, and soils that are similar to this Legore soil but that have slopes of less than 15 percent. Included areas make up about 15 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. Available water capacity is moderate. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks and home site developments.

This soil has severe limitations for building sites because of slope. Designing, roads, and streets to conform to the natural slope helps to control erosion. Using a suitable base material for roads helps to prevent damage from frost action.

Recreation developments have severe limitations because of slope. Play areas and walkways require grading and special surfacing. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by paths and trails following the contour of the slope. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

18B—Legore loam, 0 to 8 percent slopes, stony

This nearly level to gently sloping, well drained soil is on broad ridges, side slopes, and shoulders of the Piedmont Plateau. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and 2 to 50 acres in size. Stones and boulders cover 0.1 percent of the surface.

Typically, the surface layer is very dark grayish brown loam about 5 inches thick. The subsurface layer is yellowish brown loam about 4 inches thick. The subsoil is strong brown loam over dark yellowish brown clay loam. It is about 23 inches thick. The substratum to a depth of 65 inches or more is very dark grayish brown sandy loam. The underlying material is disintegrated rock that is olive variegated with other colors. In some areas the surface layer is silt loam or gravelly silt loam.

Included with this unit in mapping are small areas of Jackland and Montalto soils. Also included are small areas of very stony soils, soils that are similar to this Legore soil but that are moderately well drained or less than 65 inches deep, and variable fill material from nearby areas. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. The available water capacity is moderate. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks.

This soil has few limitations for building sites. Homes with basements may be built in areas where the depth to bedrock is more than 60 inches. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope and stones on the surface. Stones and boulders will be difficult to remove for landscaping and grading. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes in steeper areas.

18C—Legore loam, 8 to 15 percent slopes, stony

This moderately sloping, well drained soil is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 30 acres in size. Stones and boulders cover 0.1 percent of the surface.

Typically, the surface layer is very dark grayish brown loam about 5 inches thick. The subsurface layer is yellowish brown loam about 4 inches thick. The subsoil is strong brown loam over dark yellowish brown clay loam. It is about 23 inches thick. The substratum to a depth of 65 inches or more is very dark grayish brown sandy loam. The underlying material is disintegrated rock that is olive variegated with other colors. In some areas the surface layer is silt loam or gravelly silt loam.

Included with this unit in mapping are small areas of Montalto and Relay soils. Also included are small areas of very stony soils, soils that are similar to this Legore soil but that are moderately well drained or less than 65 inches deep, and variable fill material from nearby areas. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. The available water capacity is moderate. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks.

This soil has moderate or severe limitations for building sites because of slope. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Homes with basements may be built in areas where the depth to bedrock is more than 60 inches. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope and stones on the surface. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by paths and trails following the contour of the slope. Stones and boulders will be difficult to remove for landscaping and grading. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes in steeper areas.

18E—Legore loam, 15 to 50 percent slopes, stony

This strongly sloping to steep, well drained soil is on side slopes of the Piedmont Plateau. Most areas are

irregular in shape and range from 2 to 20 acres in size. Stones and boulders cover 0.1 percent of the surface.

Typically, the surface layer is very dark grayish brown loam about 5 inches thick. The subsurface layer is yellowish brown loam about 4 inches thick. The subsoil is strong brown loam over dark yellowish brown clay loam. It is about 23 inches thick. The substratum to a depth of 65 inches or more is very dark grayish brown sandy loam. The underlying material is disintegrated rock that is olive variegated with other colors. In some areas the surface layer is silt loam or gravelly silt loam.

Included with this unit in mapping are small areas of Relay soils, very stony soils, soils that are similar to this Legore soil but that are less than 65 inches deep, and variable fill material from nearby areas. Also included are small areas of soils or fill material that has slopes of less than 15 percent or more than 45 percent. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. The available water capacity is moderate. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks.

This soil has severe limitations for building sites because of slope. Extensive cutting and filling are generally required. Cutbanks are subject to slumping and excessive erosion. Intensive measures to control runoff are needed.

Recreation developments are severely limited by slope and stones on the surface. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by paths and trails following the contour of the slope. Stones and boulders will be difficult to remove for landscaping and grading. Because of slope and stones on the surface, this soil is poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Plant cover can be established and maintained through proper seeding, mulching, and shaping slopes.

18UB—Legore-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Legore soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on broad ridges, side slopes, and shoulders of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 315 acres in size. The Legore soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Legore soil. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsurface layer is dark yellowish brown loam about 8 inches thick. The subsoil is strong brown clay loam about 10 inches thick. The substratum to a depth of 65 inches or more is strong brown and dark brown loam. In some areas stones and boulders cover 0.1 to 1 percent of the surface. In some areas as much as 20 inches of fill material covers the surface.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Legore soils.

Included with this unit in mapping are small areas of Jackland, Montalto, and Relay soils. Also included are small areas of very stony soils. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. The available water capacity is moderate in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

The Legore soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This unit has few limitations for building sites. Potential frost action, seepage, and depth to bedrock may be a problem in some areas. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope, stones on the surface, and lack of open space. Stones and boulders will be difficult to remove for landscaping or grading. The soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed.

18UC—Legore-Urban land complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, well drained Legore soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 215 acres in size. The Legore soil and Urban land occur together in such an intricate

pattern on the landscape that separating them was not practical at the scale used for mapping.

About 45 percent of this unit is relatively undisturbed Legore soil. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsurface layer is dark yellowish brown loam about 8 inches thick. The subsoil is strong brown clay loam about 10 inches thick. The substratum to a depth of 65 inches or more is strong brown and dark brown loam. In some areas stones and boulders cover 0.1 to 1 percent of the surface. In some areas the surface has been covered by as much as 20 inches of fill material.

About 35 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of Legore soils that have been cut and graded.

Included with this unit in mapping are small areas of Montalto and Relay soils. Also included are small areas of very stony soils. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. The available water capacity is moderate in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

The Legore soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Homes with basements may be built in areas where the depth to bedrock is more than 60 inches. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope, stones on the surface, and lack of open space. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails following the contour of the slope. Stones and boulders will be difficult to remove for landscaping and grading. The soil of the unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

18UE—Legore-Urban land complex, 15 to 45 percent slopes

This map unit consists of the strongly sloping to steep, well drained Legore soil. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on side slopes of dissected uplands of the Piedmont Plateau. Most areas are irregular in shape and range from 20 to 35 acres in size. The Legore soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 45 percent of this unit is relatively undisturbed Legore soil. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsurface layer is dark yellowish brown loam about 8 inches thick. The subsoil is strong brown clay loam to a depth of about 10 inches. The substratum is strong brown and dark brown loam to a depth of 65 inches or more. Stones and boulders cover 0.1 to 1 percent of the surface. In some areas the surface is covered by as much as 20 inches of fill material.

About 30 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In other areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Legore soils.

Included with this unit in mapping are small areas of Relay soils. Also included are small areas of very stony soils. Included areas make up about 25 percent of the total acreage of the unit.

Permeability of the Legore soil is moderate or moderately rapid. The available water capacity is moderate in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas

The Legore soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This unit has severe limitations for building sites because of slope. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Homes with basements may be built in areas where the depth to bedrock is more than 60 inches. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope, stones

on the surface, and lack of open space. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails following the contour of the slope. Stones and boulders will be difficult to remove for landscaping and grading. The soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

19UB—Urban land-Legore complex, 0 to 8 percent slopes

This map unit consists of Urban land and the well drained Legore soil. It is on uplands of the Piedmont Plateau that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 5 to 90 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Legore soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Legore soil. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsurface layer is dark yellowish brown loam about 8 inches thick. The subsoil is strong brown clay loam about 10 inches thick. The substratum is strong brown and dark brown loam to a depth of 65 inches or more.

Included with this unit in mapping are small areas of Chester, Montalto, and Relay soils. Also included are small areas of cut and fill. Included areas make up about 15 percent of the total area of the unit. The percentage varies from one area to another.

Permeability of the Legore soil is moderate or moderately rapid. The available water capacity is moderate in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water holding capacity is low.

The Legore soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This unit has few limitations for building sites. However, lack of open space limits most building activity to sites where old buildings have been razed. Using suitable base material for roads or parking lots helps to prevent damage from frost action.

Recreation developments are limited by slope, small stones on the surface, and lack of open space. The Legore soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed. It is limited for these uses by lack of open space and by partial shade. Areas with heavy foot traffic or with deep cuts or excavations tend to be droughty. Landscaped areas require shade-tolerant and drought-resistant lawn grasses and plants.

19UC—Urban land-Legore complex, 8 to 15 percent slopes

This map unit consists of areas of Urban land and well drained Legore soil. It is on uplands of the Piedmont Plateau that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 15 to 70 acres in size. The slope is dominantly 8 to 15 percent. Urban land and the Legore soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Legore soil. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsurface is dark yellowish brown loam about 8 inches thick. The subsoil is strong brown clay loam about 10 inches thick. The substratum to a depth of 65 inches or more is strong brown and dark brown loam.

Included with this unit in mapping are small areas of Chester, Manor, and Relay soils. Also included are small areas of cut and fill. Included areas make up about 15 percent of the total area of the unit. The percentage varies from one area to another.

Permeability of the Legore soil is moderate or moderately rapid. The available water capacity is moderate in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water holding capacity is low.

The Legore soil in the open part of the map unit is used

for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This soil has moderate or severe limitations for building sites because of slope. Lack of open space limits most building activity to sites of razed old buildings. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by lack of open space and slope. Play areas and walkways may require grading and special surfacing. Erosion and sedimentation can be controlled by maintaining adequate plant cover. The soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs but is limited by the lack of open space and by partial shade. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes. Landscaped areas require shade-tolerant and drought-resistant lawn grasses and plants.

20B—Leonardtown silt loam, 0 to 8 percent slopes

This nearly level to gently sloping, poorly drained soil is on upland depressions of the Coastal Plain. The slope is dominantly 0 to 3 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 25 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsurface layer is yellowish brown silt loam about 10 inches thick that has few light brownish gray mottles. In the upper 15 inches the subsoil is gray silty clay loam that has common fine distinct yellowish brown mottles. In the middle 6 inches it is light gray silty clay loam that has many yellowish brown mottles. In the lower 14 inches it is dark yellowish brown silty clay loam that has many light gray and gray mottles. The substratum is light brownish gray loam that has common medium distinct brownish yellow mottles. It extends to a depth of 65 inches or more. In some areas the surface layer is loam or sandy loam.

Included with this unit in mapping are small areas of Beltsville, Elkton, Keyport, Mattapex, and Woodstown soils and Fluvents. Also included are small areas of soils that are wetter and areas of fill from dumping of variable soil materials. Included areas make up 20 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Leonardtown soil has a perched water table between the surface and a depth of 12 inches, above the very dense layer, or fragipan, from late fall to early spring.

Permeability of the Leonardtown soil is slow or very slow. Available water capacity is moderate. Shrink-swell potential is low. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

Most areas of this unit are used for open space, parks, cemeteries, and potential building sites.

The soil has severe limitations for building sites because of wetness. Intensive drainage is needed if roads or buildings are constructed. The unit is difficult to drain but slope helps to remove surface water. In the upper layer the Leonardtown soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments are severely limited by wetness and slow permeability. Because of wetness, this soil is poorly suited to lawn grasses, ornamental trees, shrubs, and gardens. This soil is suited to wetland and wildlife habitat.

20UB—Leonardtown-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, poorly drained Leonardtown soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 3 percent but ranges to 8 percent in some areas. This unit is on upland flats and in depressions of the Coastal Plain. Areas are irregular in shape and range from 2 to 190 acres in size. The Leonardtown soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Leonardtown soil. Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsurface layer is yellowish brown silt loam about 10 inches thick. It has few light brownish gray mottles. In the upper 15 inches the subsoil is gray silty clay loam that has common fine distinct yellowish brown mottles. In the middle 6 inches it is light gray silty clay loam that has many medium prominent yellowish brown mottles. In the lower 14 inches it is dark yellowish brown silty clay loam that has many medium prominent light gray and gray mottles. The substratum is light brownish gray loam that has common medium distinct brownish yellow mottles to a depth of 65 inches or more. In some areas the surface layer is loam or sandy loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete,

asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas that have been cut and graded.

Included with this unit in mapping are small areas of Beltsville, Elkton, Keyport, Mattapex, and Woodstown soils and Fluvents. Also included are small areas of fill of variable soil materials from nearby areas. Included areas make up about 20 percent of the total acreage.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Leonardtown soil has a water table at a depth of 0 to 12 inches from late fall to early spring.

Permeability of the Leonardtown soil is slow or very slow. Available water capacity is moderate. Shrink-swell potential is low. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

The Leonardtown soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This soil has severe limitations for building sites because of wetness. Intensive drainage is needed if roads or buildings are constructed. The unit is difficult to drain without ditches or outlets for the excess water. The upper layer of the Leonardtown soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments are severely limited by wetness and slow permeability. Because of wetness, the soil of this unit is poorly suited to lawn grasses, ornamental trees, shrubs, and gardens.

21C—Manor loam, 8 to 15 percent slopes

This moderately sloping, somewhat excessively drained soil is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is strong brown loam about 28 inches thick. It has many mica flakes. The substratum is strong brown loam to a depth of 65 inches or more. It also has many mica flakes.

Included with this unit in mapping are small areas of Brandywine and Chester soils. Also included are small areas of urban land, small areas of fill of variable soil materials from nearby areas or from grading, and some small areas where 0.1 to 1 percent of the surface is covered with stones. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Manor soil is moderate or moderately rapid. Available water capacity is high. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid to moderately acid in unlimed areas.

Most areas of this unit are used for open space and parks.

This unit has moderate or severe limitations for building sites because of slope. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Cutbanks are subject to excessive erosion. Frost action and slope are moderate limitations for local roads and streets.

Recreation developments are limited by slope and the hazard of erosion. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails following the contour of the slope. This soil is suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated for terraces are generally droughty. Plant cover can be established and maintained through proper seeding, mulching, and shaping of the slope.

21E—Manor loam, 15 to 50 percent slopes

This moderately steep to steep, somewhat excessively drained soil is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 3 to 75 acres in size.

Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is strong brown loam about 28 inches thick. It has many mica flakes. The substratum is strong brown loam to a depth of 65 inches or more. It also has many mica flakes.

Included with this unit in mapping are small areas of Brandywine soils. Also included are small areas of urban land, small areas of fill of variable soil material from nearby areas or from grading, and some small areas where 0.1 to 1 percent of the surface is covered with stones. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Manor soil is moderate or moderately rapid. Available water capacity is high. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid to moderately acid in unlimed areas.

Most areas of this unit are used for open space and parks.

This unit has severe limitations for building sites because of slope. Extensive cutting and filling are generally needed. Cutbanks are subject to excessive erosion. Intensive measures to control runoff are needed.

Recreation developments are limited by slope and the hazard of erosion. Erosion and sedimentation can be

controlled by maintaining adequate plant cover and by laying out paths and trails following the contour of the slope. The soils of this unit are poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens because of slope. Areas that are very deeply cut or excavated for terraces are generally droughty.

22UB—Manor-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, somewhat excessively drained Manor soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on narrow ridges and side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 5 to 75 acres in size. The Manor soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Manor soil. Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is strong brown loam about 28 inches thick. It has many mica flakes. The substratum is strong brown loam to a depth of 65 inches or more. It also has many mica flakes.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away.

Included with this unit in mapping are small areas of Brandywine and Chester soils. Also included are small areas of as much as 20 inches of fill of variable soil material from nearby areas or from grading and some small areas where 0.1 to 1 percent of the surface is covered with stones. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Manor soil is moderate or moderately rapid. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid to moderately acid in unlimed areas.

The Manor soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has few limitations for building sites. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

This unit has few limitations for recreation development. Lack of open space, small stones, and slope will limit possible areas for playgrounds. Unless protected, paths and trails are subject to erosion. The soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated are generally very sandy and droughty.

22UC—Manor-Urban land complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, somewhat excessively drained Manor soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on the side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 50 acres in size. The Manor soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Manor soil. Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is strong brown loam about 28 inches thick. It has many mica flakes. The substratum is strong brown loam to a depth of 65 inches or more. It also has many mica flakes.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In other areas most or all of the profile has been cut away.

Included with this unit in mapping are small areas of Brandywine and Chester soils. Also included are small areas of as much as 20 inches of fill of variable soil material from nearby areas or from grading and some small areas where 0.1 to 1 percent of the surface is covered with stones. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Manor soil is moderate or moderately rapid. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid to moderately acid in unlimed areas.

The Manor soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Cutbanks are subject to excessive erosion. Frost action and slope are moderate limitations for local roads and streets.

Recreation developments have moderate or severe limitations because of slope and the hazard of erosion. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. The soil of this unit is suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Areas that are very deeply cut or excavated for terraces are generally droughty. Slope is a moderate limitation. Plant cover can be established and maintained through proper seeding, mulching, and shaping of the slope.

23UB—Urban land-Manor complex, 0 to 8 percent slopes

This map unit consists of areas of Urban land and somewhat excessively drained Manor soil. It is on uplands of the Piedmont Plateau that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 15 to 40 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Manor soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Manor soil. Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is strong brown loam about 28 inches thick. It has many mica flakes. The substratum is strong brown loam to a depth of 65 inches or more. It also has many mica flakes.

Included with this unit in mapping are small areas of Chester, Joppa, Legore, and Sassafras soils. Also included are small areas of cut and fill. In some areas 0.1 to 1 percent of the surface is covered with stones or the surface has been covered by as much as 20 inches of fill material. Included areas make up about 15 percent of the total area of the unit. The percentage varies from one area to another.

Permeability of the Manor soil is moderate or moderately rapid. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid to moderately acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water holding capacity is low.

The Manor soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This unit has few limitations for building sites. However, lack of open space limits most building activity to sites where old buildings have been razed. Using suitable base material for construction of roads or parking lots will prevent damage from frost action.

Recreation developments are limited by lack of open space. The soil of this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs. It is limited by lack of open space and by partial shade. Landscaped areas require shade-tolerant lawn grasses and plants.

24UB—Matapeake-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Matapeake soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on broad uplands and side slopes of the Coastal Plain. Most areas are irregular in shape and range from 1 to 15 acres in size. The Matapeake soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Matapeake soil. Typically, the surface layer is black silt loam about 4 inches thick. The subsurface layer is yellowish brown silt loam about 11 inches thick. The subsoil is strong brown and light brown silty clay loam about 35 inches thick. The substratum to a depth of 65 inches or more is variegated strong brown, reddish yellow, and pink silty clay loam. In some areas the surface layer is loam or the surface has been covered by as much as 20 inches of fill material. In some pedons ironstone is between the subsoil and substratum.

About 40 percent of this unit is areas of Urban land. In some areas the soil is largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Matapeake soils.

Included with this unit in mapping are small areas of Christiana, Joppa, Sassafras, Mattapex, and Beltsville soils. Also included are small areas of Matapeake soils that have a gravelly or sandy substratum. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Matapeake soil is moderate or moderately slow. Available water capacity is very high in undisturbed areas and moderate or low in highly

urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid to strongly acid in unlimed areas.

The Matapeake soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope and cutbanks of excavations caving in. Sloped banks or shoring helps to prevent cave-ins. Grading is necessary on steeper slopes of the unit for construction of small commercial buildings. For local roads and streets, low strength is a moderate limitation. In the upper layer the Matapeake soil will need to be replaced or covered with a suitable base material to overcome this limitation.

Recreation developments are limited by moderately slow permeability. Play areas and walkways may require special surfacing. Unless protected, paths and trails are subject to erosion. The soils and fill material are suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated may be droughty.

25B—Mattapex silt loam, 0 to 8 percent slopes

This nearly level to gently sloping, moderately well drained soil is on upland depressions of the Coastal Plain. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 20 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 12 inches thick. The subsurface layer is brown silt loam about 8 inches thick. In the upper 12 inches the subsoil is dark yellowish brown silt loam. In the lower 9 inches it is yellowish brown silt loam that has common fine faint grayish brown mottles. The substratum to a depth of 65 inches or more is yellowish brown sandy loam that has many fine distinct strong brown mottles. In some areas the lower part of the substratum is silty clay loam or loam. In some areas the surface layer is loam or sandy loam.

Included with this unit in mapping are small areas of Beltsville soils, Leonardtown soils, and soils that are similar to this Mattapex soil but that have slopes of more than 8 percent. Also included are small areas of Matapeake soils that have a clay substratum and fill of variable soil material. Included areas make up about 20 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. The areas of the Mattapex soil that are not drained have a water table at a depth of 18 to 36 inches from winter to early spring.

Permeability of the Mattapex soil is moderately slow. Available water capacity is high. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid to strongly acid in unlimed areas.

Most areas of this unit are used for parks, golf courses, open space, potential building sites, lawns, and gardens.

This unit has moderate or severe limitations for building sites because of seasonal wetness and slope. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. Sloped banks or shoring will prevent cutbanks of excavations from caving in. In the upper layer the Mattapex soil needs to be replaced or covered with a suitable base material to help reduce damage from low strength on local roads and streets.

Recreation developments are limited by seasonal wetness, slope, and slow permeability. In some areas play areas and walkways require special surfacing. Unless protected, paths and trails are subject to erosion. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

25UB—Mattapex-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, moderately well drained Mattapex soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on upland depressions of the Coastal Plain. Most areas are irregular in shape and range from 2 to 90 acres in size. The Mattapex soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 50 percent of this unit is relatively undisturbed Mattapex soil. Typically, the surface layer is very dark grayish brown silt loam about 12 inches thick. The subsurface layer is brown silt loam about 8 inches thick. In the upper 12 inches the subsoil is dark yellowish brown silt loam. In the lower 9 inches it is yellowish brown silt loam that has grayish brown mottles. The substratum to a depth of 65 inches or more is yellowish brown sandy loam that has strong brown mottles. In some areas the lower part of the substratum is silty clay loam or loam. In some areas the surface layer is loam or sandy loam or the surface has been covered by as much as 20 inches of fill material.

About 30 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, other impervious surfaces, or more

than 20 inches of fill material. In some areas most or all the profile has been cut away.

Included with this unit in mapping are small areas of Beltsville soils, Leonardtown soils, and soils that are similar to the Mattapex soil but that have slopes of more than 8 percent. Also included are small areas of Matapeake soils that have a clay substratum and fill of variable soil material. Included areas make up about 20 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. The areas of the Mattapex soil that are not drained have a water table at a depth of 18 to 36 inches from winter to early spring.

Permeability of the Mattapex soil is moderately slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid to strongly acid in unlimed areas.

The Mattapex soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of seasonal wetness and slope. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. Sloped banks or shoring will prevent cutbanks of excavations from caving in. In the upper layer the Mattapex soil needs to be replaced or covered with a suitable base material to help reduce damage from low strength on local roads and streets.

Recreation developments are limited by seasonal wetness, slope, and slow permeability. Play areas and walkways may require special surfacing. Unless protected, paths and trails are subject to erosion. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

26B—Montalto silt loam, 0 to 8 percent slopes

This nearly level to gently sloping, well drained soil is on ridges, shoulders, and side slopes of the Piedmont Plateau. The slope is dominantly 0 to 3 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 75 acres in size.

Typically, the surface layer is dark reddish brown silt loam about 18 inches thick. In the upper 6 inches the subsoil is dark red clay. In the next 8 inches it is red clay loam. In the lower 10 inches it is yellowish red silty clay loam. The substratum extends to a depth of 65 inches or more. In the upper 10 inches it is red loam. In the lower part it is mixed strong brown and yellowish red loam and soft, decomposed, basic igneous rock. In some pedons the surface layer is loam or silty clay loam.

Included with this unit in mapping are small areas of Jackland and Legore soils and small areas of Montalto soils that have a bouldery, very stony, or extremely stony surface layer. Also included are small areas of fill from garbage dumps or from variable soil materials and severely eroded or graded Montalto soils that have a clay or silty clay surface layer. Included areas make up about 15 percent of the total acreage of the unit, but the actual percentage varies from area to area.

Permeability of the Montalto soil is moderately slow. Available water capacity is high. Shrink-swell potential is high. Potential frost action is moderate. Reaction is very strongly acid to slightly acid, but the acidity increases with depth in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks.

This soil has severe limitations for building sites because of high shrinking and swelling. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the soil. This soil has severe limitations for local roads and streets because of high shrinking and swelling and low strength. If this soil is used as a base for roads and streets, mixing in sand and gravel will increase its strength and stability.

Recreation developments are limited by moderately slow permeability, slope, and small stones. Stones and boulders in included areas may be difficult to remove. In some places play areas and walkways require special surfacing. Unless protected, paths and trails are subject to erosion. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

26C—Montalto silt loam, 8 to 15 percent slopes, very stony

This moderately sloping, well drained soil is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 15 acres in size. In most areas stones and boulders cover 1 to 3 percent of the surface.

Typically, the surface layer is reddish brown silt loam about 18 inches thick. In the upper 6 inches the subsoil is dark red clay. In the next 8 inches it is red clay loam. In the lower 10 inches it is yellowish red silty clay loam. The substratum extends to a depth of 65 inches or more. In the upper 10 inches it is red loam. In the lower part it is mixed, strong brown and yellowish red loam and soft, decomposed, basic igneous rock. In some pedons the surface layer is loam or silty clay loam.

Included with this unit in mapping are small areas of

Legore soils. Also included are small areas of fill of variable soil materials from adjacent areas and severely eroded Montalto soils that have a surface layer of clay or silty clay that is gravelly in some places. Included areas make up about 15 percent of the total acreage of the unit, but the percentage varies from one area to another.

Permeability of the Montalto soil is moderately slow. Available water capacity is high. Shrink-swell potential is high. Potential frost action is moderate. Reaction is very strongly acid to slightly acid, but acidity increases with depth in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks.

This soil has severe limitations for building sites because of slope and high shrinking and swelling. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the soil. This soil has severe limitations for local roads and streets because of high shrinking and swelling and low strength. If this soil is used as a base for roads and streets, it can be mixed with sand and gravel to increase its strength and stability.

Recreation developments are limited by slope and by stones and boulders on the surface. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Stones and boulders on the surface may be difficult to remove. Because of slope and the stony surface, this soil is poorly suited to lawn grasses and vegetable gardens. It is suited to shade trees, ornamental trees, shrubs, and vines. In areas with few or no stones, plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

26UB—Montalto-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Montalto soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 3 percent but ranges to 8 percent in some areas. This unit is on ridges and side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 2 to 245 acres in size. The Montalto soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Montalto soil. Typically, the surface layer is reddish brown silt loam about 18 inches thick. In the upper 6 inches the subsoil is dark red clay. In the next 8 inches it is red clay loam. In the lower 10 inches it is yellowish red silty clay loam. The substratum extends to a depth of 65 inches or more. In the upper 10 inches it is red loam. In the lower part it is mixed, strong brown and yellowish red loam and soft, decomposed, basic igneous rock. In some pedons the surface layer is loam or silty clay loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of Montalto soils that have been cut or graded.

Included with this unit in mapping are small areas of Jackland and Legore soils and small areas of Montalto soils that have a bouldery, very stony, or extremely stony surface layer. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Montalto soil is moderately slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is high. Potential frost action is moderate. Reaction is very strongly acid to slightly acid, but acidity increases with depth in unlimed areas.

The Montalto soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has severe limitations for building sites because of high shrinking and swelling. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the soil. This soil has severe limitations for local roads and streets because of high shrinking and swelling and low strength. If this soil or fill material taken from this unit is used as a base for roads and streets, mixing it with sand and gravel increases its strength and stability.

Recreation developments are limited by moderately slow permeability, small stones, and slope. Stones and boulders in included areas may be difficult to remove. Play areas and walkways may require special surfacing. The soils and fill material are suited to lawn grasses, flowers, vegetables, trees, and shrubs.

26UC—Montalto-Urban land complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, well drained Montalto soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on side slopes of the Piedmont Plateau. Most areas are irregular in

shape and range from 4 to 15 acres in size. The Montalto soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 45 percent of this unit is relatively undisturbed Montalto soil. Typically, the surface layer is reddish brown silt loam about 18 inches thick. In the upper 6 inches the subsoil is dark red clay. In the next 8 inches it is red clay loam. In the lower 10 inches it is yellowish red silty clay loam. The substratum extends to a depth of 65 inches or more. In the upper 10 inches it is red loam. In the lower part it is mixed strong brown and yellowish red loam and soft, decomposed, basic igneous rock. In some areas the surface layer is loam or silty clay loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut or graded Montalto soils.

Included with this unit in mapping are small areas of Legore soils. Also included are small areas of disturbed soils that have been graded to less than an 8 percent slope. Included areas make up 15 percent of the total acreage of the unit.

Permeability of the Montalto soil is moderately slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is high. Potential frost action is moderate. Reaction is very strongly acid to slightly acid, and acidity increases with depth in unlimed areas.

The Montalto soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has severe limitations for building sites because of slope and high shrinking and swelling. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Foundations and footings need to be designed to prevent structural damage caused by shrinking and swelling of the soil. This soil has severe limitations for local roads and streets because of high shrinking and swelling and low strength. If the soil or fill material of this unit is used as a base for roads and streets, it can be mixed with sand and gravel to increase its strength and stability.

Recreation developments are limited by slope and moderately slow permeability. Stones and boulders in included areas may be difficult to remove. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Play areas and walkways may require special surfacing. The soils and fill material are suited to lawn grasses, flowers, vegetables, trees, and shrubs, but are limited by slope. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

27UB—Urban land-Montalto complex, 0 to 8 percent slopes

This map unit consists of areas of Urban land and the well drained Montalto soil. It is on uplands of the Piedmont Plateau that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 5 to 35 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Montalto soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Montalto soil. Typically, the surface layer is reddish brown silt loam about 18 inches thick. In the upper 6 inches the subsoil is dark red clay. In the next 8 inches it is red clay loam. In the lower 10 inches it is yellowish red silty clay loam. The substratum extends to a depth of 65 inches or more. In the upper 10 inches it is red loam. In the lower part it is mixed strong brown and yellowish red loam and soft, decomposed, basic igneous rock.

Included with this unit in mapping are small areas of Legore soils. Also included are small areas of severely eroded Montalto soils that have red clayey material exposed at the surface and small areas of cut and fill. Included areas make up about 15 percent of the total area of the unit, but the percentage varies from one area to another.

Permeability of the Montalto soil is moderately slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is high. Potential frost action is moderate. Reaction is very strongly acid to slightly acid, and acidity increases with depth in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water holding capacity is low.

The Montalto soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This unit has severe limitations for building sites

because of a lack of open space and high shrinking and swelling. Most building activity in this complex is on sites where old buildings have been razed. Foundations and footings need to be designed to prevent the structural damage caused by shrinking and swelling of the soil. This unit has severe limitations for local roads and streets because of high shrinking and swelling and low strength. If this soil or fill material taken from this unit is used as a base for roads, streets, or parking lots, mixing it with sand and gravel increases its strength and stability.

Recreation developments are limited by lack of open space, moderately slow permeability, slope, and small stones. In some areas play areas and walkways require special surfacing. The soil in this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs but is limited by lack of open space and by partial shade. Landscaped areas require shade-tolerant grasses and plants.

28B—Relay silt loam, 0 to 8 percent slopes, very stony

This nearly level to gently sloping, well drained soil is on side slopes and shoulders of the Piedmont Plateau. Most areas are irregular in shape and 2 to 20 acres in size. Stones cover 3 percent of the surface.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is olive brown silt loam about 9 inches thick. The subsoil is olive brown silt loam about 15 inches thick. The substratum is dark yellowish brown silt loam over olive sandy loam. It extends to a depth of 65 inches or more. In some areas the surface layer is loam or gravelly loam.

Included with this unit in mapping are small areas of Legore and Manor soils. Also included are small areas of stony soils, rock outcrop, moderately well drained soils near springs or seeps, urban land, and fill of variable soil materials from nearby areas. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Relay soil is moderate. Available water capacity is moderate or high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is very strongly acid to neutral in unlimed areas.

Most areas of this unit are used for open space, parks, and potential building sites.

This soil has moderate limitations for building sites because of shrinking and swelling, slope, and depth to bedrock. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Homes with basements can be built in areas where the depth to bedrock is more than 60 inches. Using suitable base material for roads helps to prevent damage from low strength.

Recreation developments are limited by stones on the surface. Stones and boulders are difficult to remove for landscaping and grading. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes in steeper areas.

28C—Relay silt loam, 8 to 15 percent slopes, very stony

This moderately sloping, well drained soil is on side slopes of the Piedmont Plateau. Small streams and creeks dissect many of the areas. Most areas are irregular in shape and 2 to 15 acres in size. Stones cover 3 percent of the surface.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is olive brown silt loam about 9 inches thick. The subsoil is olive brown silt loam about 15 inches thick. The substratum is dark yellowish brown silt loam over olive sandy loam. It extends to a depth of 65 inches or more. In some areas the surface layer is loam or gravelly loam.

Included with this unit in mapping are small areas of Legore and Manor soils. Also included are small areas of stony soils, rock outcrop, moderately well drained soils near springs or seeps, urban land, and fill of variable soil materials from nearby areas. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Relay soil is moderate. Available water capacity is moderate or high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is very strongly acid to neutral in unlimed areas.

Most areas of this unit are used for open space, parks, and potential building sites.

This soil has moderate limitations for building sites because of slope, shrinking and swelling, and depth to bedrock. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Homes with basements can be built in areas where the depth to bedrock is more than 60 inches. Using suitable base material for roads helps to prevent damage from low strength.

Recreation developments are limited by stones on the surface. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Stones and boulders will be difficult to remove for landscaping and grading. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes in steeper areas.

28E—Relay silt loam, 15 to 60 percent slopes, very stony

This moderately sloping to steep, well drained soil is on side slopes of the Piedmont Plateau. Small streams and creeks dissect many areas. Most areas are irregular in shape and 3 to 85 acres in size. Stones cover 3 percent of the surface.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is olive brown silt loam about 9 inches thick. The subsoil is olive brown silt loam about 15 inches thick. The substratum is dark yellowish brown silt loam over olive sandy loam. It extends to a depth of 65 inches or more. In some areas the surface layer is loam or gravelly loam.

Included with this unit in mapping are small areas of Legore and Manor soils. Also included are small areas of stony soils, rock outcrop, moderately well drained soils near springs or seeps, and fill of variable soil materials from nearby areas. Included areas make up 15 percent of the total acreage of the unit.

Permeability of the Relay soil is moderate. Available water capacity is moderate or high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is very strongly acid to neutral in unlimed areas.

Most areas of this unit are used for open space, parks, and undeveloped land in industrial parks.

This soil has severe limitations for building sites because of slope. Extensive cutting and filling are generally required. Cutbanks are subject to slumping and excessive erosion. Intensive measures to control runoff are needed. Using suitable base material for roads helps to prevent damage from low strength.

Recreation developments are severely limited by slope, stones on the surface, and the hazard of erosion. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Stones and boulders will be difficult to remove for landscaping and grading. This soil is poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens.

28UB—Relay-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Relay soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. Slopes of 0 to 3 percent are limited to areas that have been leveled. This unit is on side slopes and shoulders of the Piedmont Plateau. Most areas are irregular in shape and range from 5 to 30 acres in size. The Relay soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Relay soil. Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is olive brown silt loam about 9 inches thick. The subsoil is olive brown silt loam about 15 inches thick. The substratum is dark yellowish brown silt loam over olive sandy loam. It extends to a depth of 65 inches or more. In some areas the surface layer is loam or gravelly loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Legore soils.

Included with this unit in mapping are small areas of Legore and Manor soils. Also included are small areas of very stony soils, moderately well drained soils near springs or seeps, and fill of variable soil materials from nearby areas. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Relay soil is moderate. Available water capacity is moderate or high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

The Relay soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate limitations for building sites because of shrinking and swelling, slope, depth to bedrock, and cutbanks of excavations caving in. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Homes with basements can be built in areas where the depth to bedrock is more than 60 inches. Using suitable base material for roads helps to prevent damage from frost action and shrinking and swelling.

Recreation developments are limited by stones on the surface in uncleared areas and by lack of open space. Stones and boulders are difficult to remove for landscaping or grading. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed.

28UC—Relay-Urban land complex, 8 to 15 percent slopes

This map unit consists of the moderately sloping, well drained Relay soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 3 to 30 acres in size. The Relay soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 45 percent of this unit is the relatively undisturbed Relay soil. Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is olive brown silt loam about 9 inches thick. The subsoil is olive brown silt loam about 15 inches thick. The substratum is dark yellowish brown silt loam over olive sandy loam. It extends to a depth of 65 inches or more. In some areas the surface layer is loam or gravelly loam or the surface has been covered by as much as 20 inches of fill material.

About 35 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Legore soils.

Included with this unit in mapping are small areas of Legore and Manor soils. Also included are small areas of very stony soils, moderately well drained soils near springs or seeps, and fill of variable soil material from nearby areas. Included areas make up 20 percent of the total acreage of the unit.

Permeability of the Relay soil is moderate. Available water capacity is moderate or high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is very strongly acid to neutral in unlimed areas.

The Relay soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope, shrinking and swelling, depth to bedrock, and cutbanks of excavations caving in. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Homes with basements can be built in areas where the depth to bedrock is more than 60 inches. Using suitable base material for roads helps to prevent damage from frost action and shrinking and swelling.

Recreation developments are limited by slope, stones on the surface in uncleared areas, and lack of open space. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Stones and boulders are difficult to remove for landscaping or grading. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs if stones are removed. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

28UE—Relay-Urban land complex, 15 to 45 percent slopes

This map unit consists of the moderately steep to steep, well drained Relay soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on side slopes of the Piedmont Plateau. Most areas are irregular in shape and range from 10 to 25 acres in size. The Relay soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 45 percent of this unit is the relatively undisturbed Relay soil. Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is olive brown silt loam about 9 inches thick. The subsoil is olive brown silt loam about 15 inches thick. The substratum is dark yellowish brown silt loam over olive sandy loam. It extends to a depth of 65 inches or more. In some areas the surface layer is loam or gravelly loam or the surface has been covered by as much as 20 inches of fill material.

About 30 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Relay soils.

Included with this unit in mapping are small areas of Legore and Manor soils. Also included are small areas of very stony soils, moderately well drained soils near springs or seeps, soils with graded slopes of less than 15 percent, and fill of variable soil materials from nearby areas. Included areas make up 25 percent of the total acreage of the unit.

Permeability of the Relay soil is moderate. Available water capacity is moderate or high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost

action is moderate. Reaction is very strongly acid to neutral in unlimed areas.

The Relay soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 350 to 7,000 square feet in size.

This unit has severe limitations for building sites because of slope. Extensive cutting and filling are generally required. Cutbanks are subject to slumping and excessive erosion. Intensive measures to control runoff are needed.

Recreation developments are severely limited by slope, stones on the surface in uncleared areas, and the hazard of erosion. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Stones and boulders will be difficult to remove for landscaping or grading. The soil is poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

29B—Sassafras gravelly loam, 0 to 8 percent slopes

This nearly level to gently sloping, well drained soil is on level uplands, side slopes, and ridges of the Coastal Plain. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 75 acres in size.

Typically, the surface layer is very dark gray gravelly loam about 2 inches thick. The subsurface layer is yellowish brown gravelly loam about 4 inches thick. In the upper 21 inches the subsoil is dark yellowish brown gravelly loam. In the lower 15 inches it is strong brown over dark yellowish brown loam. The substratum to a depth of 65 inches or more is strong brown gravelly sandy loam. In some areas the surface layer is sandy loam, loam, or silt loam. In some areas ironstone is between contrasting layers of soil material.

Included with this unit in mapping are small areas of Galestown, Joppa, or Matapeake soils. Also included are small areas of urban land and fill with a mixture of materials ranging from clay to sand. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sassafras soil is moderate. Available water capacity is moderate or high. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Most areas of this unit are used for parks, open space, lawns, gardens, and schoolyards.

This unit has moderate or severe limitations for building sites because of slope and cutbank cave-ins. Sloped banks or shoring prevents cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by small stones. Unless protected, paths and trails are subject to erosion. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated are generally very sandy and droughty.

29C—Sassafras gravelly loam, 8 to 15 percent slopes

This moderately sloping, well drained soil is on side slopes of the Coastal Plain. Most areas are irregular in shape and range from 2 to 20 acres in size.

Typically, the surface layer is very dark gray gravelly loam about 2 inches thick. The subsurface layer is yellowish brown gravelly loam about 4 inches thick. In the upper 21 inches the subsoil is dark yellowish brown gravelly loam. In the lower 15 inches it is strong brown over dark yellowish brown loam. The substratum is strong brown gravelly sandy loam to a depth of 65 inches or more. In some areas the surface layer is sandy loam, loam, or silt loam. In some areas ironstone is between contrasting layers of soil material.

Included with this unit in mapping are small areas of Galestown, Joppa, or Matapeake soils. Also included are small areas of urban land and fill that has a mixture of materials ranging from clay to sand. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sassafras soil is moderate. Available water capacity is moderate or high. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Most areas of this unit are used for parks, open space, lawns, gardens, and schoolyards.

This unit has moderate or severe limitations for building sites because of slope and cutbank cave-ins. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope and small stones. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs, but is limited by slope. Areas that are very deeply cut or excavated are generally very sandy and droughty. Plant cover can be established and maintained through proper seeding, mulching, and shaping of the slope.

29UB—Sassafras-Urban land complex, 0 to 8 percent slopes

This map unit consists of the nearly level to gently sloping, well drained Sassafras soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 3 to 120 acres in size. The Sassafras soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Sassafras soil. Typically, the surface layer is very dark gray gravelly loam about 2 inches thick. The subsurface layer is yellowish brown gravelly loam about 4 inches thick. In the upper 21 inches the subsoil is dark yellowish brown gravelly loam. In the lower 15 inches it is strong brown over dark yellowish brown loam. The substratum is strong brown gravelly sandy loam to a depth of 65 inches or more. In some areas the surface layer is sandy loam, loam, or silt loam or the surface has been covered by as much as 20 inches of fill material. In some areas ironstone is between contrasting layers of soil material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Sassafras and Joppa soils.

Included with this unit in mapping are small areas of Galestown, Joppa, and Matapeake soils. Also included are small areas of fill that consists of building rubbish, cinders, incinerator ash, and other nonsoil waste material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sassafras soil is moderate. Available water capacity is moderate or high in undisturbed areas and low or very low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

The Sassafras soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope and cutbank cave-ins. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by small stones. Slope and lack of open space limit possible areas for playgrounds. Unless protected, paths and trails are subject to erosion. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated are generally very sandy and droughty.

29UC—Sassafras-Urban land complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, well drained Sassafras soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on uplands of the Coastal Plain. Areas are irregular in shape and range from 2 to 80 acres in size. The Sassafras soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Sassafras soil. Typically, the surface layer is very dark gray gravelly loam about 2 inches thick. The subsurface layer is yellowish brown gravelly loam about 4 inches thick. In the upper 21 inches the subsoil is dark yellowish brown gravelly loam. In the lower 15 inches it is strong brown over dark yellowish brown loam. The substratum is strong brown gravelly sandy loam to a depth of 65 inches or more. In some areas the surface layer is sandy loam, loam, or silt loam or the surface has been covered by as much as 20 inches of fill material. In some areas ironstone is between contrasting layers of soil material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Sassafras and Joppa soils.

Included with this unit in mapping are small areas of Galestown, Joppa, and Matapeake soils. Also included are small areas of fill that consists of building rubbish, cinders, incinerator ash, and other nonsoil waste material. The included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sassafras soil is moderate. Available water capacity is moderate or high in undisturbed areas that are highly urbanized. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

The Sassafras soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope and cutbank cave-ins. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope and small stones. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs, but is limited by slope. Areas that are very deeply cut or excavated are generally very sandy and droughty. Plant cover can be established and maintained through proper seeding, mulching, and shaping of the slope.

30B—Sassafras-Joppa complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained and somewhat excessively well drained Sassafras and Joppa soils. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 2 to 150 acres in size. The Sassafras and Joppa soils occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Sassafras soil. Typically, the surface layer is very dark gray gravelly loam about 2 inches thick. The subsurface layer is yellowish brown gravelly loam about 4 inches thick. In the upper 21 inches the subsoil is dark yellowish brown gravelly loam. In the lower 15 inches it is strong brown over dark yellowish brown loam. The substratum is strong brown gravelly sandy loam to a depth of 65 inches or more. In some areas the surface layer is sandy loam, loam, or silt loam. In some areas ironstone is between contrasting layers of soil material.

About 40 percent of this unit is relatively undisturbed Joppa soil. Typically, the surface layer is very dark grayish brown over dark brown gravelly sandy loam about 10 inches thick. The subsurface layer is yellowish brown very gravelly sandy loam about 6 inches thick. The subsoil is strong brown very gravelly sandy loam about 8 inches thick. The substratum is stratified reddish yellow sand, loamy sand, and sandy loam to a depth of 65 inches or more.

Included with this unit in mapping are small areas of Matapeake soils. Also included are small areas of urban land and fill that has a mixture of materials ranging from clay to sand. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sassafras soil is moderate. Available water capacity is moderate or high. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Permeability of the Joppa soil is moderately rapid. Available water capacity is low. Shrink-swell potential is low. Potential frost action is low. Reaction is extremely acid to strongly acid in unlimed areas.

Most areas of this unit are used for parks, open space, lawns, gardens, and schoolyards.

This unit has moderate or severe limitations for building sites because of slope and cutbank cave-ins. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited because of small stones. Unless protected, paths and trails are subject to erosion. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated are generally very sandy and droughty.

31UB—Urban land-Sassafras complex, 0 to 8 percent slopes

This map unit consists of areas of Urban land and the well drained Sassafras soil. It is on uplands of the Coastal Plain that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 5 to 290 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Sassafras soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Sassafras soil. Typically, the surface layer is dark brown loam about 4 inches thick. The subsurface layer is dark yellowish brown gravelly loam about 8 inches thick. The subsoil is strong brown gravelly loam about 23 inches thick. The substratum is brown gravelly sandy loam to a depth of 65 inches or more. In some areas the surface layer is sandy loam, loam, or silt loam. In some areas ironstone is between contrasting layers of soil material.

Included with this unit in mapping are small areas of Beltsville, Keyport, Joppa, and Matapeake soils and areas of cut and fill. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability of the Sassafras soil is moderate. Available water capacity is moderate or high in undisturbed areas and low or very low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water capacity is low or very low.

The Sassafras soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This unit has moderate or severe limitations for building sites because of slope and cutbank cave-ins. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action. However, lack of open space limits most building to sites where old buildings have been razed. In some areas cuts deeper than 5 feet will expose unstable clay.

Recreation developments are limited by small stones and lack of open space. The soils and fill material are suited to lawn grasses, flowers, vegetables, trees, and shrubs, but are limited by lack of open space and by partial shade. Areas with heavy foot traffic or with deep cuts or excavations tend to be droughty. Landscaped areas require shade-tolerant and drought-resistant lawn grasses and plants.

32—Sulfaquepts, dredge

This map unit consists of nearly level, very deep, very poorly drained and poorly drained soils that formed in sulfur-rich sediments dredged from the harbor. The sediments were deposited along dikes on the shore and elsewhere on flood plains of the Coastal Plain. They were used to make sites for buildings, roads, railroads, recreation areas, and other uses. Areas range from 2 to about 80 acres in size. Slopes are very complex and irregular. They range from nearly level to steep but are dominantly nearly level. The thickness of the fill varies, but is more than 2 feet. The dredged fill material used in this unit came from variable sources; hence, it consists of organic and inorganic waste from human activities and of silty, sandy, gravelly, clayey, and micaceous soil material.

Silty, acid dredged fill makes up about 80 percent of this unit and old dikes and dumps make up the rest. The fill is made up of building rubbish, trash, cinders, incinerator ash, and other industrial waste and small areas of variable earthen fill. This earthen fill was taken from soils from nearby upland areas or from dredged materials that had low sulfur content when deposited onsite.

Permeability is quite variable in this unit. Available water capacity is variable. In some areas that have been highly compacted, water tends to pond on the surface after heavy rainfall. Runoff and internal drainage are quite variable. Areas of dredged fill have low strength and are extremely acid.

Most areas of this unit are used for open space, parks, industrial sites, and wildlife habitat (fig. 7). Some areas of this unit are almost totally covered with buildings, asphalt, concrete, or other impervious surfaces.

Most areas of this unit are subject to subsidence and so have poor potential for use as building sites. The extreme acidity of the dredge fill is also potentially corrosive for most building materials. Recreation developments are severely limited by wetness. Though many of these areas are used as habitat for waterfowl and estuarine animals, the extreme acidity and high metal content of the harbor dredgings may be toxic to some species. A detailed onsite investigation is needed to determine the potentials and limitations of these areas for any proposed use.

33B—Sunnyside-Christiana complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Sunnyside and Christiana soils. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 5 to 70 acres in size. The Sunnyside and Christiana soils occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Sunnyside soil. Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. The substratum extends to a depth of 65 inches or more. In the upper 13 inches the substratum is red and light reddish brown loamy fine sand. In the lower part it is pink loamy fine sand. In some areas the surface layer is sandy loam, loam, or silt loam. In some areas ironstone is between contrasting layers of soil material. In some areas the substratum is clay loam, clay, or silty clay.

About 35 percent of this unit is relatively undisturbed Christiana soil. Typically, the surface layer is very dark

Figure 7.—Sulfaquepts, dredge, are well suited to wildlife habitat; however, the extreme acidity and high metal content may be toxic to some species.

brown loam about 3 inches thick. The subsurface layer is yellowish red silt loam about 8 inches thick. In the upper 16 inches the subsoil is red clay loam. In the next 19 inches it is dark red and strong brown clay. In the lower 10 inches it is yellowish red clay. The substratum is yellowish red and strong brown silty clay to a depth of 65 inches or more. In some areas the surface layer is silt loam or sandy loam.

Included with this unit in mapping are small areas of similar soils that have a sandy, gravelly, or silty surface layer or soils that have a perched water table above the clay layer. Also included are small areas of urban land and fill of variable soil material from nearby areas or from grading. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability of the Sunnyside soil is moderate. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Permeability of the Christiana soil is moderately slow or slow. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Most areas of this unit are used for parks, open space, lawns, gardens, and schoolyards.

This unit has moderate limitations for building sites because of clayey texture, slope, and shrinking and swelling on the Christiana soil. The Sunnyside soil has severe limitations for building sites because of the potential for cutbanks to cave in. Steep cutbanks or deep excavations in this unit are difficult to stabilize, and the clay in the substratum frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below. Because of instability and low strength, the clay, particularly when under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil in graded areas. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope and slow permeability in the Christiana soil. Cuts or fills need to be seeded or mulched. Erosion and sedimentation can be controlled by maintaining adequate plant cover. The soils are suited to lawn grasses, flowers, vegetables, trees, and shrubs.

33C—Sunnyside-Christiana complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, well drained Sunnyside and Christiana soils. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 5 to 25 acres in size. The Sunnyside and Christiana soils occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Sunnyside soil. Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. In the upper 13 inches the substratum is red and light reddish brown loamy fine sand. In the lower part the substratum is pink loamy fine sand to a depth of 65 inches or more. In some areas the surface layer is sandy loam, loam, or silt loam. In some areas ironstone is between contrasting layers of soil material. In some areas the substratum is clay loam, clay, or silty clay.

About 35 percent of this unit is relatively undisturbed Christiana soil. Typically, the surface layer is very dark brown loam about 3 inches thick. The subsurface layer is yellowish red silt loam about 8 inches thick. In the upper 16 inches the subsoil is red clay loam. In the next 19 inches it is dark red and strong brown clay. In the lower 10 inches it is yellowish red clay. The substratum to a depth of 65 inches or more is yellowish red and strong brown silty clay. In some areas the surface layer is silt loam or sandy loam.

Included with this unit in mapping are small areas of similar soils that have a sandy, gravelly, or silty surface layer or soils that have a perched water table above the clay layer. Also included are small areas of urban land and fill of variable soil material from nearby areas or from grading. Included areas make up about 25 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability of the Sunnyside soil is moderate. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Permeability of the Christiana soil is moderately slow or slow. Available water capacity is high. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Most areas of this unit are used for parks, open space, lawns, gardens, and schoolyards.

This unit has moderate or severe limitations for building sites because of slope, clayey texture, and shrinking and swelling in the Christiana soil. The Sunnyside soil has severe limitations because of the potential for cutbanks to cave in. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Steep cutbanks or deep excavations in this unit are difficult to stabilize, and the clay in the substratum frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below. Because of instability and low strength, the clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil in graded areas. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Careful grading of slope and diversion of runoff is needed around heavy use areas to protect the soil from slumping or gully erosions. The soils are suited to lawn grasses, flowers, vegetables, trees, and shrubs, but are limited by slope. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

33UB—Urban land-Sunnyside complex, 0 to 8 percent slopes

This map unit consists of areas of Urban land and well drained Sunnyside soil. It is on uplands of the Coastal Plain that have been altered by grading for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 5 to 160 acres in size. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Urban land and the Sunnyside soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Sunnyside soil. Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. The substratum extends to a depth of 65

inches or more. In the upper 13 inches it is red and light reddish brown loamy fine sand. In the lower part it is pink loamy fine sand. In some areas the surface layer is sandy loam or loam.

Included with this unit in mapping are small areas of Beltsville, Christiana, Keyport, Joppa, and Sassafras soils and areas of cut and fill. Included areas make up about 15 percent of the total acreage of the unit. The percentage varies from one area to another.

Permeability of the Sunnyside soil is moderate. Available water capacity is moderate or high in undisturbed areas and low or very low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water capacity is low or very low.

The Sunnyside soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This unit has moderate or severe limitations for building sites because of slope and the potential for cutbanks to cave in. However, lack of open space limits most building activity to sites where old buildings have been razed. In some areas cuts deeper than 5 feet encounter unstable clay.

Recreation developments are limited by lack of open space. The soils and fill material are suited to lawn grasses, flowers, vegetables, trees, and shrubs, but are limited by lack of open space and by partial shade. Areas with heavy foot traffic or with deep cuts or excavations tend to be droughty. Landscaped areas require shade-tolerant and drought-resistant lawn grasses and plants.

33UC—Sunnyside-Urban land complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, well drained Sunnyside soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 2 to 70 acres in size. The Sunnyside soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Sunnyside soil. Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. The substratum extends to a depth of 65 inches or more. In the upper 13 inches it is red and light reddish brown loamy fine sand. In the lower part it is pink loamy fine sand. In some areas the surface layer is sandy loam or loam or the surface has been covered by as much as 20 inches of fill material. In some areas ironstone is between contrasting layers of soil material. In some areas the substratum is clay loam, clay, or silty clay.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Sunnyside and Christiana soils.

Included in this unit are small areas of Christiana soils and soils that are similar to this Sunnyside soil but that have slopes of less than 8 percent or more than 15 percent. Also included are small areas of Sunnyside soils that are gravelly sandy loam throughout the profile. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sunnyside soil is moderate. Available water capacity is moderate or high in undisturbed, highly urbanized areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

The Sunnyside soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope and the potential for cutbanks to cave in. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs, but is limited by slope. Areas that are very deeply cut or excavated are generally very sandy and droughty. Plant cover can be established and maintained through proper seeding, mulching, and shaping of the slope.

34UB—Urban land-Sunnyside-Christiana complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Sunnyside and Christiana soils and Urban

land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 3 to 150 acres in size. The Sunnyside and Christiana soils and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Sunnyside and Christiana soil.

About 25 percent of this unit is relatively undisturbed Sunnyside soil. Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. The substratum extends to a depth of 65 inches or more. In the upper 13 inches it is red and light reddish brown loamy fine sand. In the lower part it is pink loamy fine sand. In some areas the surface layer is sandy loam, loam, or silt loam or the surface has been covered by as much as 20 inches of fill material. In some areas ironstone is between contrasting layers of soil material. In some areas the substratum is clay loam, clay, or silty clay.

About 20 percent of this unit is relatively undisturbed Christiana soil. Typically, the surface layer is very dark brown loam about 3 inches thick. The subsurface layer is yellowish red silt loam about 8 inches thick. In the upper 16 inches the subsoil is red clay loam. In the next 19 inches it is dark red and strong brown clay. In the lower 10 inches it is yellowish red clay. The substratum is yellowish red and strong brown silty clay to a depth of 65 inches or more. In some areas the surface layer is silt loam or sandy loam or the surface has been covered by as much as 20 inches of fill material.

Included with this unit in mapping are small areas of similar soils that have a sandy or gravelly substratum and small areas of soils that have a perched water table above the clay layer. Included areas make up about 15 percent of the total acreage of the unit.

Permeability of the Sunnyside soil is moderate in the solum and moderately slow in the substratum. Available water capacity is high in undisturbed areas and low or moderate in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Permeability of the Christiana soil is moderately slow or slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

The Sunnyside and Christiana soils in the open parts of the map unit are used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate limitations for building sites because of clayey texture, slope, and shrinking and swelling in the Christiana soil. The Sunnyside soil has severe limitations because of the potential for cutbanks to cave in. Steep cutbanks or deep excavations in this unit are difficult to stabilize, and the clay in the substratum frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below. Because of instability and low strength, the clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil in graded areas. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope and the hazard of erosion in steeper areas, slow permeability in the Christiana soil, and lack of open space. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

34UC—Urban land-Sunnyside-Christiana complex, 8 to 15 percent slopes

This map unit consists of moderately sloping, well drained Sunnyside and Christiana soils and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 2 to 90 acres in size. The Sunnyside and Christiana soils and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Sunnyside and Christiana soils.

About 20 percent of this unit is relatively undisturbed Sunnyside soil. Typically, the surface layer is very dark

gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. The substratum extends to a depth of 65 inches or more. In the upper 13 inches it is red and light reddish brown loamy fine sand. In the lower part it is pink loamy fine sand. In some areas the surface layer is sandy loam, loam, or silt loam or the surface has been covered by as much as 20 inches of fill material. In some areas ironstone is between contrasting layers of soil material. In some areas the substratum is clay loam, clay, or silty clay.

About 20 percent of this unit is relatively undisturbed Christiana soil. Typically, the surface layer is very dark brown loam about 3 inches thick. The subsurface layer is yellowish red silt loam about 8 inches thick. In the upper 16 inches the subsoil is red clay loam. In the next 19 inches it is dark red and strong brown clay. In the lower 10 inches it is yellowish red clay. The substratum is yellowish red and strong brown silty clay to a depth of 65 inches or more. In some areas the surface layer is silt loam or sandy loam or the surface has been covered by as much as 20 inches of fill material.

Included with this unit in mapping are small areas of similar soils that have a sandy or gravelly substratum. Also included are small areas of similar soils that have slopes of less than 8 percent or more than 15 percent. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sunnyside soil is moderate in the solum and moderately slow in the substratum. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Permeability of the Christiana soil is moderately slow or slow. Available water capacity is high in undisturbed areas and moderate or low in highly urbanized, compacted areas. Shrink-swell potential is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

The Sunnyside and Christiana soils in the open parts of the map unit are used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope, clayey texture, and shrinking and swelling in the Christiana soil. The Sunnyside soil has severe limitations because of the potential for cutbanks to cave in. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Steep cutbanks or deep excavations in this unit are difficult to stabilize, and the clay in the substratum frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below. Because of instability and low strength, the clay, particularly when it is under pressure or load, can squeeze out from under building foundations, allowing footings and basements to crack and settle. Roads and streets need to be designed to compensate for the low strength and instability of the clayey soil in graded areas. Using suitable base material for roads helps to prevent damage from frost action.

Recreation development is limited by slope and lack of open space. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. Careful grading of slope and diversion of runoff is needed around heavy use areas to protect the soil from slumping or gully erosion. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs, but is limited by slope. Plant cover can be established and maintained through proper seeding, mulching, and shaping of slopes.

35B—Sunnyside fine sandy loam, 0 to 8 percent slopes

This nearly level to gently sloping, well drained soil is on level uplands, side slopes, and ridges of the Coastal Plain. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. Most areas are irregular in shape and range from 2 to 45 acres in size.

Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. The substratum extends to a depth of 65 inches or more. In the upper 13 inches the substratum is red and light reddish brown loamy fine sand. In the lower part it is pink loamy fine sand. In some areas the surface layer is sandy loam, loam, or silt loam. In some areas ironstone is between contrasting layers of soil material.

Included with this unit in mapping are small areas of Christiana soils, gravelly Sunnyside soils, and urban land. Also included are small areas of fill that consists of mixed, clayey to sandy soil material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sunnyside soil is moderate. Available water capacity is moderate or high. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Most areas of this unit are used for parks, open space, lawns, gardens, and schoolyards.

This unit has moderate or severe limitations for building sites because of slope and the potential for cutbank cave-ins. Sloped banks or shoring will prevent cutbanks of

excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

The unit has few limitations for recreation developments. Unless protected, paths and trails are subject to erosion. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated are generally very sandy and droughty.

35C—Sunnyside fine sandy loam, 8 to 15 percent slopes

This moderately sloping, well drained soil is on side slopes of the Coastal Plain. Most areas are irregular in shape and range from 2 to 15 acres in size.

Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. The substratum extends to a depth of 65 inches or more. In the upper 13 inches it is red and light reddish brown loamy fine sand. In the lower part it is pink loamy fine sand. In some areas the surface layer is sandy loam or loam. In some areas ironstone is between contrasting layers of soil material.

Included with this unit in mapping are small areas of undisturbed Christiana soils, gravelly Sunnyside soils, and urban land. Also included are small areas of severely eroded or graded Sunnyside soils or sandy or clayey fill material taken from nearby areas of Sunnyside or Christiana soils. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sunnyside soil is moderate. Available water capacity is moderate or high. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

Most areas of this unit are used for parks, open space, lawns, gardens, and schoolyards.

This unit has moderate or severe limitations for building sites because of slope and the potential for cutbank cave-ins. Designing buildings, roads, and streets to conform to the natural slope helps to control erosion. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

Recreation developments are limited by slope. Erosion and sedimentation can be controlled by maintaining adequate plant cover and by laying out paths and trails on the contour of the slope. This soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs, but is limited by slope. Areas that are very deeply cut or excavated are generally very sandy and droughty. Plant cover can be established and maintained through proper seeding, mulching, and shaping of the slope.

36UB—Sunnyside-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, well drained Sunnyside soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent but ranges to 8 percent in some areas. This unit is on uplands of the Coastal Plain. Most areas are irregular in shape and range from 3 to 120 acres in size. The Sunnyside soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Sunnyside soil. Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is strong brown fine sandy loam about 5 inches thick. The subsoil is red sandy clay loam about 29 inches thick. The substratum extends to a depth of 65 inches or more. In the upper 13 inches it is red and light reddish brown loamy fine sand. In the lower part it is pink loamy fine sand. In some areas the surface layer is sandy loam, loam, or silt loam or the surface has been covered by as much as 20 inches of fill material. In some areas ironstone is between contrasting layers of soil material. In some areas the substratum is clay loam, clay, or silty clay.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all of the profile has been cut away. The fill material is most commonly from adjacent areas of cut and graded Sunnyside and Christiana soils.

Included with this unit in mapping are small areas of Christiana soils and gravelly Sunnyside soils that are sandy loam throughout. Also included are small areas of fill that consists of building rubbish, cinders, incinerator ash, and other nonsoil waste material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability of the Sunnyside soil is moderate. Available water capacity is moderate or high in undisturbed areas and low or very low in highly urbanized, compacted areas. Shrink-swell potential is low. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas.

The Sunnyside soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas generally consist of management units that range from 350 to 7,000 square feet in size.

This unit has moderate or severe limitations for building sites because of slope and the potential for cutbank cave-ins. Sloped banks or shoring will prevent cutbanks of excavations from caving in. Using suitable base material for roads helps to prevent damage from frost action.

This unit has few limitations for recreation developments. Lack of open space and slope will limit possible areas for playgrounds. Unless protected, paths and trails are subject to erosion. The soil is suited to lawn grasses, flowers, vegetables, trees, and shrubs. Areas that are very deeply cut or excavated are generally very sandy and droughty.

37—Sulfaquepts, frequently flooded

This map unit consists of nearly level, very deep, very poorly drained soils developed from sulfur-rich, dredged harbor sediments. The sediments were deposited along dikes on the shore and in tidal marshes and flood plains of the Coastal Plain. They were used to make sites for buildings, roads, railroads, recreation areas, and other uses. Most areas are inundated by the estuary of the Patapsco River and the Chesapeake Bay for part of the year. Areas range from 2 acres to about 15 acres in size. Slopes range from nearly level to gently sloping but are dominantly nearly level. The thickness of the fill varies, but is more than 2 feet. The dredge fill material used in this unit is variable, and so is organic and inorganic waste from human activities mixed with silty, sandy, gravelly, clayey, and micaceous soil material.

Sapric or hemic organic material 4 to 16 inches thick overlying silty, high-sulfur, dredged material used as fill makes up about 80 percent of this unit. Drained or dry areas are extremely acid. About 20 percent of the unit consists of old dikes and dumps that have been filled. The fill consists of building rubbish, trash, cinders, incinerator ash, industrial waste, and other nonsoil waste material; small areas of variable earthen fill taken from soils of nearby upland areas or low-sulfur, dredged material; and small areas of soils where more than 16 inches of hemic and sapric organic material covers the surface.

Permeability is variable in this unit. Available water capacity is variable. This map unit consists of many small and a few fairly large areas covered regularly by tidal water. Most areas have high salt content, but a few are only brackish. The soils when wet have a very low bearing capacity. The vegetation consists of marsh grass, sedges, salt-tolerant herbs, and low shrubs.

Most areas of this unit are used for open space, parks, and wildlife habitat.

Most areas of this unit are subject to subsidence and flooding, and so have poor potential for use as building sites. If the unit is drained, the dredge fill becomes extremely acid and is potentially corrosive to most building materials. Recreation developments are severely limited by wetness.

This unit is not suited to landscaping, lawn grasses, or trees. It is suitable for use as wildlife habitat. Along with adjacent waterways, it is suitable for some kinds of outdoor recreation. Though many of these areas are used as habitat for waterfowl and estuarine animals, the high metal content of harbor dredgings may be toxic to some species. Detailed, onsite investigation is needed to determine the potentials and limitations of these areas for any proposed use.

38C—Udorthents, clayey, very deep, 0 to 15 percent slopes

These soils consist of mostly clayey fill material placed on well drained soils on uplands of the Coastal Plain. Most areas are 4 to 15 acres in size. Slopes are very complex and irregular. The thickness of the fill varies, but is more than 20 inches. The fill material used in this unit was taken from Christiana and Keyport soils, and generally is a homogeneous mixture of clayey material.

Typically, the surface layer is about 2 inches thick. It is very dark grayish brown clay loam that has glass fragments throughout. The subsoil fill material extends to a depth of 65 inches or more. It consists of mixed layers of red, strong brown, yellowish red, pinkish gray, and gray silty clay loam, clay, and silty clay that has small pockets of unexposed lignite throughout.

Included with this unit in mapping are small areas of soils that formed in alluvium and Christiana and Keyport soils, none of which was filled in. In a few places small areas of fill consist of building rubbish, cinders, industrial waste, incinerator ash, and other nonsoil waste material. Also included are a few areas of gravelly fill material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability is variable but commonly slow in this unit. Available water capacity is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit are subject to differential settling and so have moderate limitations for building sites and severe limitations for local roads and streets. This unit has moderate limitations for most recreation uses because of slow permeability and poor trafficability. Areas that are not highly compacted have limited potential for lawns, landscaping, and vegetable gardens. A careful onsite investigation is needed to determine the potentials and limitations of these areas for any proposed use.

39B—Udorthents, loamy, deep, 0 to 8 percent slopes

These soils consist mostly of loamy fill material placed on soils of various drainage classes on terraces, uplands, and flood plains of the Piedmont Plateau. Most areas are 2 to 45 acres in size. These areas have been created to provide sites for buildings, roads, recreation facilities, and other uses. Slopes are very complex and irregular. They range from nearly level to moderately sloping but are dominantly nearly level. The thickness of the fill is variable, but is more than 20 inches. The fill material used in this map unit was taken from areas of Jackland, Chester, Manor, Legore, Matapeake, and Sunnyside soils and so is homogeneous, mixed loamy material.

Typically, the surface layer is very dark grayish brown loam about 3 inches thick. The subsoil fill material extends to a depth of 40 inches. It is mixed layers of strong brown and yellowish brown loam, silt loam, or clay loam that has small pockets of soft, decomposed, basic, igneous rock. The undisturbed substratum extends to a depth of 65 inches or more. It is soft, decomposed, basic igneous rock that has areas of strong brown and dark brown loam.

Included with this unit in mapping are small areas of Jackland, Chester, Legore, and Montalto soils that were not filled in. In a few places small areas of fill consist of building rubbish, cinders, industrial wastes, incinerator ash, and other nonsoil waste material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability is variable but commonly slow. Available water capacity is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit have moderate limitations for use as building sites because of differential settling, wetness, and shrink-swell potential. The construction of roads and streets is severely limited because of low strength. Areas that are not highly compacted are suited to lawns, landscaping, vegetable gardens, and recreation areas. Compacted areas have low fertility and slow permeability and so have poor potential for most types of vegetation. A careful onsite investigation is needed to determine the potentials and limitations of areas of this unit for any proposed land use.

39C—Udorthents, sanitary landfill, 0 to 15 percent slopes

This nearly level to moderately sloping unit consists of areas where refuse has been disposed. Several feet of refuse has been placed on flood plains or in low-lying areas and covered with 3 to 4 feet of miscellaneous earthen fill. Areas range from about 2 to 130 acres in size.

Typically, the surface is covered with a thin layer of sewage sludge. In many places this material has been disked into the underlying fill material. The fill material extends to a depth of about 2 to 4 feet. It is mixed, sandy, gravelly, clayey, silty, or micaceous soil material. It varies in texture over short distances. Many areas of this fill material are gravelly or cobbly. Most areas contain fragments of brick, glass, wood, wire, cement, and asphalt. Refuse extends from the base of the fill material to an undetermined depth. It is in various degrees of decomposition. But in many areas it is raw and hardly decomposed. In other areas it is either slightly or completely burned. In some places it contains such metallic refuse as springs, wheels, cans, and wire. It releases an odor of natural gas when pits are dug into it.

Included with this unit in mapping are a few areas where the entire profile is made up of miscellaneous fill and no refuse is in the underlying material. Also included are a few areas where the fill is somewhat thicker or thinner than 4 feet over refuse. Included areas make up about 5 percent of the total acreage of the unit.

Permeability and the available water capacity are variable. In the upper 3 or 4 feet this unit is very dense and compacted.

This unit is poorly suited to most building uses. The refuse underlying this unit contains high levels of natural gas, which is a building hazard. Some areas were filled in with varying materials and are subject to differential settling. Because of slope and a highly compacted surface, this unit is poorly suited to shrubs, trees, vegetable gardens, and other vegetation. Vegetables grown on this land could take up toxic metals from sewage sludge on the surface. Careful, onsite investigation is needed to determine the potentials and limitations of areas of this unit for any proposed land use.

39E—Udorthents, loamy, deep, 15 to 60 percent slopes

These soils consist of mostly loamy fill material that has been cut or filled during grading for buildings, roads, recreation facilities, and other uses. The fill has been placed on well drained to excessively drained soils on uplands of the Piedmont Plateau. Areas range from about 2 to 50 acres in size. The thickness of the fill is variable, but is more than 20 inches. The fill material used in this map unit was taken from areas of Legore, Manor, and Relay soils and so is homogeneous, mixed loamy material.

Typically, the surface layer is very dark grayish brown loam about 3 inches thick. The subsoil fill material extends to a depth of 40 inches. It is mixed layers of strong brown and yellowish brown loam, silt loam, or clay loam that has small pockets of soft, decomposed, basic

igneous rock. The undisturbed substratum extends to a depth of 65 inches or more. It is soft, decomposed, basic igneous rock that has areas of strong brown and dark brown loam.

Included with this unit in mapping are small areas of Brandywine, Legore, Manor, and Relay soils that were not filled in. In a few places small areas of fill consist of building rubbish, cinders, industrial waste, incinerator ash, and other nonsoil waste material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability is variable but commonly slow. The available water capacity is moderate. Potential frost action is moderate. Reaction is strongly acid to slightly acid in unlimed areas.

Most areas of this unit have severe limitations for use as building sites and for construction of roads because of slope and differential settling. Slope also limits this unit for lawns, landscaping, and vegetable gardens. Careful, onsite investigation is needed to determine the potentials and limitations of areas of this unit for any proposed land use.

40B—Udorthents, loamy, very deep, 0 to 8 percent slopes

These soils consist of mostly loamy fill material that has been placed on soils of various drainage classes on terraces, uplands, and flood plains of the Coastal Plain. Most areas are 2 to 25 acres in size. These areas have been created to provide sites for buildings, roads, recreation facilities, and open space along four-lane highways. Slopes are very complex and irregular. They range from nearly level to gently sloping but are dominantly nearly level. The thickness of the fill varies, but is more than 20 inches. The fill material used in this map unit was taken from areas of Beltsville, Matapeake, Mattapex, Sassafras, and Sunnyside soils, and so is homogeneous, mixed loamy material.

Typically, the surface layer is very dark grayish brown sandy loam about 2 inches thick. The subsoil fill material extends to a depth of 65 inches or more. It is mixed layers of red, strong brown, yellowish red, pinkish gray, and gray sandy loam or loam that has ironstone fragments throughout.

Included with this unit in mapping are small areas of Beltsville, Matapeake, Mattapex, Sassafras, and Sunnyside soils that were not filled in. Included in a few places are small areas of building rubbish, cinders, industrial waste, incinerator ash, and other nonsoil waste material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability is variable but commonly slow in this unit. Available water capacity is moderate. Potential frost action is moderate. Reaction is very strongly acid in unlimed areas.

Most areas of this unit are subject to differential settling, and so have moderate limitations for use as building sites, roads, and recreation areas. The areas that are not highly compacted have good potential for lawns, landscaping, and vegetable gardens. The severely compacted areas have low fertility and are droughty, and so have poor potential for most vegetation. Careful, onsite investigation is needed to determine the potentials and limitations of areas of this unit for any proposed land use.

40C—Udorthents, loamy, very deep, 8 to 15 percent slopes

These soils consist mostly of loamy fill material that has been cut or filled during grading for buildings, roads, recreational facilities, and other uses. The fill has been placed on well drained and moderately well drained soils on uplands of the Coastal Plain. Most areas are 2 to 45 acres in size. The thickness of the fill varies, but is more than 20 inches. The fill material used in this map unit was taken from Beltsville, Matapeake, Mattapex, Sassafras, and Sunnyside soils, and so is homogeneous, mixed loamy material.

Typically, the surface layer is very dark grayish brown sandy loam about 2 inches thick. The subsoil fill material extends to a depth of 65 inches or more. It consists of mixed layers of red, strong brown, yellowish red, pinkish gray, and gray sandy loam or loam that has ironstone fragments.

Included with this unit in mapping are small areas of Beltsville, Matapeake, Mattapex, Sassafras, and Sunnyside soils that were not filled in. In a few places small areas of fill consist of building rubbish, cinders, industrial waste, incinerator ash, and other nonsoil waste material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability is variable but commonly slow. Available water capacity is moderate. Potential frost action is moderate. Reaction is very strongly acid in unlimed areas.

Most areas of this unit are subject to differential settling, and so have moderate limitations for use as building sites. The areas that are not highly compacted have moderate potential for lawns, landscaping, vegetable gardens, and recreation areas. The severely compacted areas have low fertility and are droughty, and so have poor potential for most types of vegetation. A careful onsite investigation is needed to determine the potentials and limitations of the areas of this unit for any proposed land use.

40E—Udorthents, loamy, very deep, 15 to 60 percent slopes

These soils consist mainly of loamy cut or fill material that resulted from grading for buildings, roads, recreation facilities, and other uses. The fill has been placed on soils of various drainage classes on uplands of the Coastal Plain. Most areas are 2 to 25 acres in size. Slopes are very complex and irregular. The thickness of the fill varies, but is more than 20 inches. The fill material used in this map unit consists of Joppa, Matapeake, Sassafras, and Sunnyside soils, and so is homogeneous, mixed loamy material.

Typically, the surface layer is very dark grayish brown sandy loam about 2 inches thick. The subsoil fill material extends to a depth of 65 inches or more. It consists of mixed layers of red, strong brown, yellowish red, pinkish gray, and gray sandy loam or of loam that has fragments of ironstone throughout. In areas where deep gullies have formed and lignite in undisturbed clay layers is exposed to the surface, the soil has pockets of pyrite and is extremely acid.

Included with this unit in mapping are small areas of Joppa, Sassafras, and Sunnyside soils that were not filled in. In a few places small areas of fill consist of building rubbish, cinders, industrial waste, incinerator ash, and other nonsoil waste material. Included areas make up about 20 percent of the total acreage of the unit.

Permeability is variable but commonly slow. Available water capacity is moderate. Potential frost action is moderate. Reaction is extremely acid or very strongly acid in unlimed areas that are deeply cut.

Most areas of this unit are subject to differential settling, gullying, and rill erosion. The unit has severe limitations for use as building sites because of slope and the hazard of erosion. Most areas have low fertility and are droughty; these areas have poor potential for most types of vegetation. Careful, onsite investigation is needed to determine the potentials and limitations of the areas of this unit for any proposed land use.

41E—Udorthents, gravelly, very deep, 0 to 60 percent slopes

This map unit consists of mostly gravelly fill material that has been placed on soils of various drainage classes on uplands, terraces, and flood plains. The areas have been created to provide sites for buildings, roads, recreation facilities, and other uses. The areas range from about 5 to 20 acres in size and are almost exclusively on the Coastal Plain. Slopes are very complex and irregular. They range from nearly level to steep but are dominantly nearly level. The thickness of the fill is quite variable but is more than 20 inches. The fill material in this unit consists mainly of Joppa or Sassafras soils, and so is homogeneous, mixed gravelly material.

Typically, the surface layer is dark grayish brown gravelly sandy loam about 2 inches thick. The subsoil fill material extends to a depth of 65 inches or more. It consists of mixed layers of yellowish brown, reddish yellow, and strong brown gravelly sandy loam, sand, or loamy sand that has fragments of ironstone throughout.

Included in mapping are small areas of Joppa, Sassafras, and unfilled alluvial soils. In a few places small areas of fill consist of building rubbish, cinders, industrial waste, incinerator ash, and other nonsoil solid waste material. Included areas make up about 20 percent of the mapped acreage.

Permeability is variable but commonly moderately rapid or rapid. Available water capacity is generally low. Potential frost action is low. Reaction is very strongly acid in unlimed areas.

Most areas of this unit are subject to differential settling, and so have poor potential for use as building sites. The nearly level to gently sloping areas of this unit that are not highly compacted have fair potential for lawns, landscaping, vegetable gardens, and recreation areas. The steep areas have poor potential for almost any kind of use. Careful, onsite investigation is needed to determine the potentials and limitations of these steep areas for any proposed use.

42—Udorthents-Fluvents complex, occasionally flooded

This complex consists of nearly level areas of recent alluvium deposited by fast-moving streams. Most of the natural soil has been graded, cut, filled, or otherwise disturbed to protect the area from flooding. This complex is on flood plains of major streams throughout the survey area. Most areas are long and narrow in shape and range from 5 to 40 acres in size. Udorthents and Fluvents occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

A typical area of this complex is about 80 percent Udorthents. In some areas the natural soil has been disturbed or covered with variable fill material to raise the surface above the flood plain.

Typically, the surface layer of Udorthents is about 5 inches thick. It is very dark grayish brown gravelly loam that has brick and glass fragments throughout. The subsoil fill material extends to a depth of 65 inches or more. It consists of stratified layers of strong brown, brown, and yellowish brown loam, silt loam, and gravelly loam that has pockets of stones, cobbles, and brick fragments throughout.

About 15 percent of the complex is Fluvents. The soil

material is mostly unconsolidated, stratified alluvium. It varies widely in texture and drainage over short distances.

Typically, the surface layer of Fluvents is dark brown sandy loam about 5 inches thick. In the upper 20 inches the substratum is dark grayish brown and gray silt loam that has thin lenses of sandy loam and many prominent mottles. In the lower part the substratum is gleyed, stratified sandy loam and gravelly sandy loam to a depth of 65 inches or more. The surface layer throughout is either sandy loam, silt loam, or loam.

Included in mapping are small areas of urban land and flood protection structures. Included areas make up about 5 percent of the total acreage of the unit.

Permeability and available water capacity are variable.

This unit is used for open space, wildlife habitat, and flood control.

In areas unprotected from yearly flooding, this unit is severely limited for building sites and recreation developments. In areas protected from flooding, this unit has moderate potential for most recreation uses. This unit is suited to wetland and wildlife habitat. Careful, onsite investigation is needed to determine the potentials and limitations of this unit for any proposed use.

42E—Udorthents, smoothed, 0 to 35 percent slopes

This map unit is made up of earthen fill and nonsoil material that has been placed on poorly drained to somewhat excessively drained soils on uplands, terraces, and flood plains of the Coastal Plain and Piedmont Plateau. It is on sites of buildings, roads, railroads, recreation areas, and other uses. Areas range from 2 to 570 acres in size. Slopes are very complex and irregular. They range from nearly level to steep, but are dominantly nearly level to moderately sloping. The thickness of the fill varies, but is more than 20 inches. The source of fill material in this unit is variable, mixed, organic, and inorganic waste from human activity and sandy, gravelly, clayey, silty, and micaceous soil material (fig. 8).

Typically, the surface layer is about 5 inches thick. It is very dark grayish brown gravelly sandy loam that has brick and glass fragments throughout. The subsoil fill material extends to a depth of 65 inches or more. It consists of stratified layers of strong brown, brown, pinkish gray, and gray sand, sandy loam, and gravelly sandy loam that has pockets of charcoal, ash, and brick fragments throughout.

Udorthents make up about 80 percent of this unit. The rest of the unit is areas of fill that consists of building rubbish, cinders, industrial waste, incinerator ash, and other nonsoil waste material and small areas of unaltered soils.

Figure 8.—Check dams being used on a construction site in an area of Udorthents, smoothed, 0 to 35 percent slopes, to reduce the rate of runoff and thus to control erosion.

Permeability and available water capacity are variable. In some highly compacted areas, water tends to pond on the surface after heavy rainfall.

Most areas of this unit are used for playgrounds, parks, schoolyards, playing fields, and industrial sites.

Some areas of this unit are almost totally covered with buildings, asphalt, concrete, or other impervious surfaces. Most areas are subject to differential settling and, therefore, have poor potential for use as building sites. Steep areas and areas containing large amounts of coarse fragments or solid waste are generally droughty, low in fertility, and poor in potential for almost any use. Many of the uncovered, nearly level areas, which contain only small amounts of coarse fragments, are generally high in fertility and available water capacity and thus have potential for lawns, trees, ornamental shrubs, vegetable gardens, and most recreation uses. Detailed, onsite investigation is needed to determine the potentials and limitations of these areas for any proposed use.

43U—Urban land-Udorthents complex, occasionally flooded

This complex consists of nearly level areas of Urban land built up on and adjacent to recent alluvium deposited by fast-moving streams. Most of the natural soil has been graded, cut, filled, or otherwise disturbed during urbanization. This complex is on flood plains of major streams throughout the survey area. Most areas are long and narrow in shape and range from 2 to 215 acres in size. Urban land and Udorthents occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

A typical area of this complex is about 60 percent Urban land. In some areas the surface is largely covered by concrete, asphalt, buildings, or other impervious surfaces. About 30 percent of the complex is Udorthents. The soil material is mostly unconsolidated alluvium that is stratified in undisturbed areas. It varies widely in texture and in drainage over short distances.

As an example, the surface layer of Udorthents is about 2 inches thick. It is very dark grayish brown sandy loam that has glass fragments throughout. The subsoil fill material extends to a depth of 65 inches or more. It consists of mixed or stratified layers of yellowish brown, brown, grayish brown, pale brown, or light brownish gray sandy loam, silt loam, loam, or gravelly loam.

Included with this unit in mapping are small areas of Fluvents positioned in stream channels. Included areas make up about 10 percent of the total acreage of the unit.

Permeability and available water capacity are variable.

This unit is used for buildings, playgrounds, and industrial sites.

Where unprotected, this complex is subject to flooding. Where protected from flooding, the open areas of this complex have moderate potential for use as building sites and recreation areas. Careful, onsite investigation is needed to determine the potential and limitations for any proposed use.

44UC—Urban land, 0 to 15 percent slopes

This map unit consists of nearly level to moderately sloping areas of Urban land. Urban land consists of areas where more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces. Examples are parking lots, shopping and business centers, and industrial parks. These areas are scattered throughout the survey area, but the largest are near the downtown business district and along main roads. They are on all landscape positions of the Coastal Plain and the Piedmont Plateau. The areas generally range from 2 to more than 1,000 acres in size and are nearly level to moderately sloping.

Included in mapping are large areas that are mostly miscellaneous artificial fill. In many areas several feet of this fill have been placed over streams, swamps, flood plains, and tidal marshes. These areas are now almost totally covered with roads, buildings, or other structures. Also included are a few strongly sloping and steep areas. Included areas make up about 20 percent of the total acreage of this unit.

Examination and identification of soils or soillike materials in this unit are impractical. Careful onsite investigation is needed to determine the potential and limitations for any proposed use.

45UB—Woodstown-Urban land complex, 0 to 8 percent slopes

This map unit consists of nearly level to gently sloping, moderately well drained Woodstown soil and Urban land. Urban land consists of areas that have been graded, cut, filled, or otherwise disturbed during urbanization. The slope is dominantly 0 to 5 percent, but ranges to 8 percent in some areas. This unit is on uplands and shallow depressions of the Coastal Plain. Most areas are irregular in shape and range from 2 to 180 acres in size. The Woodstown soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 40 percent of this unit is relatively undisturbed Woodstown soil. Typically, the surface layer is dark gray over dark grayish brown sandy loam. It is about 6 inches thick. In the upper 16 inches the subsoil is light olive brown sandy loam that has few fine faint dark grayish brown and dark yellowish brown mottles. In the lower 19 inches it is dark yellowish brown sandy clay loam that has many, medium, prominent light gray mottles. In the upper part the substratum is mixed dark yellowish brown and light gray sandy loam about 12 inches thick. In the lower part it is light gray clay loam that has many, medium, prominent red mottles to a depth of 65 inches or more. In some areas the surface layer is loam or the surface has been covered by as much as 20 inches of fill material.

About 40 percent of this unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The source of the fill material is most commonly the adjacent areas of cut and graded Woodstown soils.

Included with this unit in mapping are small areas of Beltsville, Leonardtown, Mattapex, and Keyport soils. Also

included are small areas of fill from dumping variable soil materials or from grading. Included areas make up 20 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Woodstown soil has a water table at a depth of 18 to 36 inches from late winter to early spring.

Permeability of the Woodstown soil is moderate in the subsoil and slow or very slow in the substratum. Available water capacity is moderate in undisturbed areas and low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

The Woodstown soil in the open part of the map unit is used for parks, open space, potential building sites, lawns, and gardens. These areas consist of management units that range from 500 to 7,000 square feet in size.

This unit has severe limitations for building sites because of seasonal wetness and high potential frost action. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. The upper layer of the Woodstown soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments are limited by seasonal wetness and slope. Play areas and walkways may require special surfacing. Unless protected, paths and trails are subject to erosion. The Woodstown soil in this unit is suited to lawn grasses, flowers, vegetables, trees, and shrubs.

46UB—Urban land-Woodstown complex, 0 to 8 percent slopes

This map unit consists of areas of Urban land and moderately well drained Woodstown soil. It is in poorly defined drainageways on uplands of the Coastal Plain. These areas were graded for housing developments, shopping centers, industrial areas, and similar uses. Most areas are irregularly shaped and range from 20 to 30 acres in size. The slope is dominantly 0 to 5 percent, but ranges to 8 percent in some areas. Urban land and the Woodstown soil occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping.

About 80 percent of the unit is areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

About 5 percent of this unit is relatively undisturbed Woodstown soil. Typically, the surface layer is dark gray over dark grayish brown sandy loam. It is about 6 inches thick. In the upper 16 inches the subsoil is light olive brown sandy loam that has few fine faint dark grayish brown and dark yellowish brown mottles. In the lower 19 inches it is dark yellowish brown sandy clay loam that has many, medium, prominent light gray mottles. The substratum is mixed dark yellowish brown and light gray sandy loam about 12 inches thick over light gray clay loam that has many, medium, prominent red mottles to a depth of 65 inches or more. In some areas the surface layer is loam or the surface has been covered by as much as 20 inches of fill material.

Included with this unit in mapping are small areas of Beltsville, Keyport, Leonardtown, and Mattapex soils. Also included are small areas of fill from dumping of variable soil materials or from grading. Included areas make up 15 percent of the total acreage of the unit.

Most areas of this map unit have such artificial drainage as sewer systems, gutters, drainage tiles, and surface ditches. In undrained areas the Woodstown soil has a water table at a depth of 18 to 36 inches from late winter to early spring.

Permeability of the Woodstown soil is moderate in the subsoil and slow or very slow in the substratum. Available water capacity is moderate in undisturbed areas and low in highly urbanized, graded areas. Shrink-swell potential is low. Potential frost action is high. Reaction is extremely acid to strongly acid in unlimed areas.

Permeability of cuts, fills, and Urban land is variable. Available water capacity is low or very low.

The Woodstown soil in the open part of the map unit is used for very narrow front yards and backyards of row houses, courtyards of apartment complexes or other large buildings, small traffic islands and circles, and narrow areas between streets and sidewalks. These areas are generally less than 500 square feet in size.

This unit has severe limitations for building sites because of location and size of open space, seasonal wetness, and high potential frost action. Most building activity is on sites where old buildings have been razed. Drainage systems are needed for construction of basements and crawl spaces under dwellings or small buildings. The upper layer of the Woodstown soil needs to be replaced or covered with a suitable base material to help reduce damage from frost action on local roads and streets.

Recreation developments are limited by wetness and lack of open space. Most areas of the soil in this unit is also subject to heavy foot traffic and partial shade. Because of these limitations, the soil is poorly suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Landscaped areas require shade-tolerant lawn grasses and plants.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Management of the Soils in an Urban Area

James C. Patterson, research agronomist, National Park Service, helped to prepare this section.

Landscaped areas in Druid Hill Park, Cylburn Arboretum, public and private golf courses, small parks downtown, schoolyards, and home lawns comprise most of the relatively undisturbed soils under intensive management in the City of Baltimore. Despite management, in many areas, because of use, these soils have compacted surfaces. Corrective measures for compacted surfaces are often difficult and expensive.

With the exceptions of Philipot, Block, and Thames Streets in Fells Point, the soils in the areas around the Inner Harbor and along the shores of Northwest Branch of the Patapsco River are largely manmade. The soils near the mouth of Gwynns Falls around the north shore of Middle Branch of the Patapsco River are also largely manmade. Most of these manmade soils were from river dredgings and used to fill in swampy areas at the influx of small streams into the river. These soils are mostly used as industrial sites and docking facilities for the shipping industry.

In other parts of the city, such as Leakin Park and Gwynns Falls Park in the west and parts of Herring Run Park in the east, the soils are generally undisturbed. In these large natural parks, many paths and trails cross steep slopes and follow the banks of major streams. Most of these areas receive at least some management for erosion or flood control. Because of high intensity flows in the stream channels and dumping of fill material from road, highway, and subway construction, the soils in stream valleys are varied. In some areas flood control and road maintenance have restricted streamflow. During flooding, this restricted streamflow has deposited significant amounts of soil materials on flood plains downstream.

Physical and Chemical Characteristics

The physical characteristics of soils in urban areas are distinctly different from those of the natural soils. The chemical characteristics are variable. The physical characteristics of soils in an urban area are best measured by bulk density. Bulk density indicates soil moisture, soil atmosphere, thermal conductivity, pore space, and ability of plant roots to adequately penetrate the soil. In an urban area, bulk density of the soil significantly increases as soils become compacted through building practices or increased foot traffic. When compacted, the soil loses some of its ability to hold moisture and is often droughty.

To illustrate the extreme bulk densities of soils in an urban area such as the City of Baltimore, typical profiles

from high use, urban areas in the District of Columbia were compared with typical agricultural soils. The range of bulk densities for the urban soils was 1.81 to 2.18 grams per cubic centimeter (average of 2.05 grams per cubic centimeter). The range for the agricultural soils was 1.33 to 1.66 grams per cubic centimeter (average 1.55 grams per cubic centimeter) *(21)*.

The other characteristics of urban soils are variable content of organic matter with profile depth, inconsistent patterns of soil materials as related to landscape and geology, mixed coarse fragments (often unrelated materials that are not oriented as they would be in streambeds), highly variable fertility and acidity, and wide variation in percentages of sand, silt, and clay with depth in the profile.

Soil Compaction

Soils in their ideal natural state consist of four principal volume fractions: 45 percent mineral matter (sand, silt, and clay); 5 percent organic matter (decayed or decaying plant parts, soil organisms, and other biological matter); 25 percent soil atmosphere (a mixture of nitrogen, oxygen, and carbon dioxide); and 25 percent water. Soil compaction reduces or destroys pore space, disrupts the movement of air and water through the soil, and changes this natural balance.

Low oxygen conditions can severely stress and often kill plants. In general, plants grow well if the soil has a high available oxygen content, and they become stressed with a decrease in the oxygen content of the soil. In a natural soil profile that has adequate pore space, the oxygen content is highest at the surface and decreases with depth. In a soil compacted by heavy foot or vehicular traffic, oxygen content near the surface can drop to 1 percent or less in extreme cases and the carbon dioxide level can rise to 19 percent or higher *(26, 27)*. Paving over a soil surface, placing a layer of clay on the soil surface, or flooding may have the same effect. Any one of these conditions can result in a change from the desired, high oxygen content in the soil to the undesirable, low oxygen content.

Soil Amendments

For flower beds or lawns, use of various soil amendments will easily correct a compacted soil *(11, 12)*. The most practical approach is mixing soil amendments into the soil before planting. In areas with mature trees, this approach may not be possible. Organic amendments that improve soils include compost (aerobically composted sewage sludge and wood chips), leaf mold, wood chips, peat moss, sphagnum moss, and bark chips. The inorganic amendments include incinerated fly ash, expanded slate, coarse construction sand, shredded rubber tires, and similar materials. Each type of soil amendment has its use, and all of them are used for the primary purpose of improving the pore space relationships in the soil and assisting in reducing the effects of compaction.

Many of these soil amendments will also increase the organic matter content in the soil. Normally, it is desirable to maintain an organic matter content of at least 5 percent. In most areas organic mulches on the surface can also be used to replace or maintain the organic material within the soil. This additional surface material will gradually improve soil tilth and fertility and will reduce soil compaction.

Inorganic soil amendments are usually added on a basis of between 20 and 30 percent of the soil volume. For some uses, such as athletic fields, coarse sand has been used to make up 99 percent of the "soil" mantle. This type of soil amendment requires scheduled watering and upkeep and may be expensive to maintain. The inorganic amendments, after being mixed into the surface layer, should persist for years to reduce compaction.

Use of the Soils for Landscaping and Gardening

Robert L. Shields, soil scientist, and Harold Stephens, conservation agronomist, Natural Resources Conservation Service, and Robert N. Cooke, management agronomist, National Park Service, helped to prepare this section.

The 1972 U.S. Department of Agriculture Yearbook, "Landscape for Living" *(18)*, covers many aspects of landscaping in urban areas. It focuses on effects of heat from pavements, salts, shade, and microclimates of individual yards. It is available in most public libraries.

Many soils in the City of Baltimore have been disturbed during excavation for utilities, foundations for buildings, and road and sidewalk construction. Many disturbed soils are in complexes made up of Urban land and Udorthents. The closer the soils are to a manmade structure, the more likely they have been disturbed. For example, wood, brick, gypsum board, metal stripping, and mortar are sometimes discarded around the foundations of buildings during construction. Later, these materials become part of the backfill around the foundation.

Practically all the undisturbed or slightly disturbed soils in the City of Baltimore are extremely acid to strongly acid. They are generally suitable to acid-loving plants, such as azaleas and rhododendrons. However, they are commonly planted very close to foundations, where the natural soil reaction is most likely to have been severely altered during construction. For these reasons, soil reaction (pH) should be tested before planting around foundations or other areas that may have been severely disturbed.

Selecting Plant Materials

The following factors, in addition to those already mentioned, need to be considered before plant materials for landscaping are selected.

Shade. Any map unit that is dominantly Urban land comprises a high density of buildings. As a result, what little soil there is between or around buildings may be in shade much of the day. Although azaleas generally grow well in these shaded locations, many common flowers and vegetables grow poorly. Areas of soils most subject to shade are very close to foundations and were likely subject to extreme physical and chemical disturbance during construction. In the complexes containing Urban land, careful observation of shade patterns and chemical analysis of the soils are needed before plants are chosen. Lime is seldom needed in shaded areas because practically all shade-tolerant plants thrive in an acid soil. Some shade-tolerant plants are rhododendrons, hollies, Oregon holly grape, camellia, azaleas, laurel, leucothoe, andromeda, and dogwoods. Regardless of the kind of soil shown on the soil map, additions of peat moss, humus, or compost into or on the surface layer will benefit these shade-tolerant plants. The roots of black walnut are toxic to rhododendrons and some other plants. Shallow-rooted trees may draw moisture away from other plantings.

Wetness. Except for ferns and mosses, not many landscaping plants grow well in wet soils, such as Baile, Elkton, Leonardtown, and Jackland soils. Management practices are needed to overcome the wetness. If soil permeability allows excess water to move through the soil to the drain tile, subsurface drainage may be installed. Or, new soil may be added to make raised beds for an adequate rooting zone. If the problem is runoff from adjacent slopes that ponds on low-lying plantings, reducing the wetness may be difficult because of property line restrictions that limit the alternatives. Even so, with the consent of neighboring landowners and the advice from a soil conservationist, a solution to the problem is possible.

Restricted root zone. Generally, soils with a restricted root zone do not hold enough moisture for plants throughout the growing season. In urban areas many such restrictions can cause failure or poor growth, but are not understood until a soils investigation reveals buried impermeable objects, such as pieces of asphalt or concrete in graded and filled areas, or evidence of continuing soil erosion or slippage. For example, these problems can occur on foot slopes of Christiana or Keyport soils or on complexes with Urban land that are subject to slippage.

Areas of Beltsville, Christiana, Jackland, Keyport, Leonardtown, or Montalto soils have been graded during construction. In these areas the dense, compact layers in the subsoil have been exposed or are covered with only a few inches of the surface layer. Shrubs, lawns, trees, and gardens planted in these areas are likely to grow poorly. Roots cannot penetrate the dense layers; therefore, plants receive limited available moisture during dry seasons and are susceptible to frost heave during freezing and thawing. Also, the exposed subsoil is a poor medium for tillage because of clayey texture or compaction. In sloping areas of these soils, runoff or seepage onto driveways and sidewalks may cause wetness in warm weather and ice hazards in winter.

Where root-restricting layers are near the surface, the root zone can be thickened by adding topsoil and by mixing as much organic matter as possible into the original soil. These practices will also increase the moisture-holding capacity of the soil.

Compaction. A noncompacted soil that has good structure is about 50 percent actual mineral soil and 50 percent pore space. When the soil is in good condition for digging, about half of the pore space is filled with water. Therefore, soil is generally tilled when it consists of about 50 percent mineral solids (soil), 25 percent air, and 25 percent water. In a highly compacted soil, the pore space has been greatly reduced by the weight of machinery or foot traffic, which forces mineral soil solids into the pore space. As a result, the soil holds less air and water and is less permeable.

Any soil that is either naturally compacted or has been mechanically compacted provides a very poor environment for roots, which shows in poor growth in the plant above ground. Some of the poorest mediums for plant growth are Beltsville, Christiana, Jackland, Joppa, and Keyport soils, where the surface layer has been removed during grading. The exposed dense, firm subsoil resists root penetration, absorbs little rainfall, and causes excessive runoff. These are extensive problems if these soils are a component of a complex with Urban land. These problems can be alleviated by incorporating organic matter into at least the upper 12 inches of a compacted soil and then keeping it well covered with mulch to protect it from future compaction by foot traffic. The mulch can be pine bark, wood chips, or other locally available material.

Salt pollution. Salts occur naturally in soils and water. They may be considered pollutants only if they are extraneous salts introduced by humans. For example, the salt used to deice walks, driveways, streets, and highways *(7)* are pollutants that can injure plants. Salt injury is suspect wherever planting is made within splash distance of streets and gutters or where runoff from driveways and walks flows onto or over the planted area.

The symptoms of salt injury vary. On trees, shrubs, and vines, burns develop on the tips or margins of leaves and the burned leaves then often drop off the plant. Stems

may dieback and the plants may eventually die. On nonwoody plants, the leaves, stems, flowers, and fruits are generally smaller. Stunting and, in extreme cases, death of plants are usually the only observable effects on most nonwoody plants.

Water draining off highways and streets can have so high a concentration of salt that adapted plants may not survive. However, some plants are more tolerant than others. Bermudagrass is able to tolerate salt concentrations about 10 times as great as those tolerated by the most sensitive species, such as African violet, rose, and strawberry. Most shrubs are moderately tolerant of salt. The most sensitive shrubs include Algerian ivy, Burford holly, and rose. Among trees, black locust and honey locust are salt tolerant. Blue spruce and white pine are relatively sensitive, and ponderosa pine, eastern red cedar, white oak, red oak, spreading juniper, and arborvitae are moderately tolerant.

For salt injury, leaching can reduce the salt concentration to below the injurious level. Leaching is applying more water to the planted area than can evaporate or than can be used by the plant. Excess water that can drain away below the roots will carry away the excess, unwanted salts. Leaching is effective only on some soils. It works reasonably well on the well drained to excessively well drained, permeable Brandywine, Chester, Galestown, Joppa, Manor, Matapeake, Sassafras, and Sunnyside soils and on the sandy or loamy Udorthents and Fluvents. The soil must have good internal drainage and not be severely compacted. On the slowly permeable Jackland, Beltsville, Christiana, Elkton, Keyport, and Mattapex soils, applying excess water may leach salts into the slowly permeable subsoil; in the subsoil they are likely to precipitate out and accumulate in the root zone.

Salt damage should not be confused with damage from other soil problems. Areas of plantings most susceptible to salt damage, such as intersections, traffic circles, and corner sidewalks, are also susceptible to heavy pedestrian traffic and trampling. In these areas both salt damage and surface compaction caused by pedestrian traffic should be considered.

Air pollution. Air pollution can distress plants; its damage to many ornamentals is often serious. Furthermore, the symptoms may be mistaken for those caused by diseases, insects *(24)*, or soil limitations.

Two of the most serious pollutants in the City of Baltimore are ozone and PAN (peroxyacetal nitrate), both of which are photochemical pollutants. Oxides of nitrogen in the air, in the presence of sunlight, react with oxygen to form ozone. Similarly, PAN is formed in sunlight by the chemical combination of nitrogen oxides with hydrocarbons in the atmosphere.

The general symptoms of ozone and PAN injury are spotted, streaked, and bleached leaves. Also plant growth is retarded, and early leaf drop sometimes occurs.

Among the annuals most sensitive to ozone are geranium, petunia, and wax begonia. Coleus, sultana, and garden verbena show only intermediate sensitivity. Kinds of annuals susceptible to PAN injury include China aster, petunia, and sultana; relatively resistant to PAN are balsam, calendula, coleus, Madagascar periwinkle, and wax begonia.

As a general rule, small-leaved plants are more resistant to air pollutants than large-leaved plants. Also, slow growing plants are more resistant than fast growing plants that have soft tissue.

Air pollution affects the plant more than it affects the soil in which it grows. Therefore, air pollution cannot be directly correlated with kinds of soil, unless an identified, named soil coincidentally occurs in an area of maximum air pollution. This is not the case in the City of Baltimore. However, air pollution is a possible cause of plant damage.

Use of the Soils for Flower and Vegetable Gardens

The basic requirement for gardens is a nearly level or gently sloping, loamy, permeable soil that has adequate aeration and moderate or high available water capacity. The pH should be generally between 6.0 and 7.0. The soils in the City of Baltimore are naturally extremely acid to strongly acid and require liming; however, important exceptions are Jackland, Legore, Montalto, and Relay soils in the northwest part of the city. On all soils, additions of lime should be determined by the results of soil tests.

The soils in the City of Baltimore that are well suited to flower and vegetable gardens are the nearly level or gently sloping areas of Chester loam, Manor loam, Matapeake loam, Legore loam, and Montalto loam and the undisturbed or slightly disturbed areas of Sunnyside fine sandy loam. All these soils are deep, well drained, easily tilled, and have moderate or high available water capacity.

Brandywine, Joppa, Manor, and Sassafras soils contain many fine to coarse gravel or rock fragments. Hence, they are less desirable for gardens because tillage is somewhat difficult and available water capacity is less than optimum.

Jackland, Beltsville, Keyport, Mattapex, and Woodstown soils are only moderately well drained. Planting in spring may be delayed 2 to 4 weeks after the frost-free dates because of wetness. When these soils dry out, they are easy to till.

Baile, Jackland, Elkton, and Leonardtown soils that are undrained are too wet for most flowers and vegetables. Also, these soils are in low positions on the landscape, many of which are frost pockets.

Galestown soils are extremely sandy throughout. Although they are the earliest to warm up in spring, they do not hold adequate moisture to maintain flowers and vegetables throughout the growing season without irrigation. They are probably the best suited of all soils in the survey area for raising melons in home gardens.

For Keyport, Christiana, or Montalto soils to be used for gardens, the loam surface layer must be maintained. Below a depth of about 10 to 12 inches, the soil is dense, sticky, plastic red clay that is difficult to dig and cultivate, either by hand or with power equipment. It is a poor seedbed, and seed germination is generally poor. When red clay is exposed at the surface, the soil is neither too wet and sticky nor too hard and dry for a few days each year. Gardens should not be planted on strongly sloping Christiana soils. Stripping the permanent vegetation from these soils and then tilling them may cause slippage of the entire slope.

Urbanized areas of Christiana soils may be disturbed or graded. If they are to be used for gardens, large amounts of organic material, such as peat, compost, and other plant residue, must be annually rototilled or spaded into the clayey surface layer. Winter cover crops are also needed.

The City of Baltimore has a community gardening program for open areas scattered throughout the city. The city is commonly the custodian of vacant property, and is responsible for making best use of it. Hence, the city allows urban gardening on selected, city-owned parcels of land (fig. 9). Cultivating vacant lots destroys weeds and removes debris-harboring vermin. But the gardens must be well kept and harvested on time to avoid attracting vermin.

Inner city gardens have a few problems that some gardens in more open areas do not. They are likely to be shaded by buildings and overhanging tree canopies and have root systems from nearby trees. If the gardens are landscaped, the shrubs sap moisture away from the garden during critical dry periods. On the other hand, many inner city gardens have better access to irrigation water from hydrants or spigots. Further, urban gardens are less susceptible to killing frosts in spring and fall.

Vines and Ground Cover

In many urban areas the soil could have been covered with grass, but because of topography, shade, or other conditions, growing grass was not practical. Even if grass will grow, other factors may make more practical the use of some other ground cover.

A ground cover plant should grow under the most adverse conditions to which it may be subjected. It should grow rapidly enough to cover and protect the area, be easily propagated, and generally be low-growing and not seriously injured if walked on *(24)*.

Species of vines and plants used for ground cover can be determined from library or Extension Service references. The same references should be consulted for adaptability of the plants to special conditions, such as shade, sun, or steep slopes. These are especially important considerations for soils mapped in complexes with Urban land, where multistory buildings may shade an area most of the day or where steep, dry slopes have been created by intensive grading and excavation.

Planting Trees and Shrubs

Trees and shrubs that can be grown in the soils of the City of Baltimore can be determined from library or Extension Service references. Before the shrub or tree can begin growing, it must first be planted in a manner to permit survival. Soil preparation for planting is critical in urban areas where the soils have been severely disturbed.

In the soil complexes dominated by Urban land, the original soil material, in many places, may have been graded, cut, filled, and compacted. The soils may also have been chemically altered by salts, oil, lime, or building material. In these areas backfilling around the root system with good, hauled-in topsoil *(18)* will lower the risk of losing an expensive ornamental plant. Backfilling also assures that roots have a good, moisture-holding medium around them while the tree or shrub is becoming established.

Even if Beltsville, Christiana, Elkton, Joppa, Jackland, and Leonardtown soils have been little disturbed, replacing excavated material from the subsoil with good loam or silt loam topsoil may improve the soil for trees and shrubs.

Trees and Shrubs for Noise Abatement

Noise from moderate-speed car traffic in urban areas can be reduced by planting 20- to 50-foot-wide belts of trees and shrubs; the edge of the belt should be 20 to 50 feet from the center of the nearest traffic lane. Shrubs 6 to 8 feet tall should be used next to the traffic lane; they should be backed by rows of trees 15 to 30 feet tall *(4)*.

For maximum noise abatement, trees and shrubs should be planted close to the noise source rather than close to the area that needs protection. Where a year-round noise screen is needed, coniferous or deciduous varieties that retain their leaves most of the year are recommended. A thin row of trees that are in poor condition as a result of neglect or an unfavorable growth environment provides little noise abatement.

A knowledge of outdoor sound propagation and some experience with noise abatement are needed to make valid judgments about use of trees and shrubs as sound barriers. When the general requirements are known, the appropriate species, with the help of a nursery, can be

Figure 9.—Urban gardens flourishing in an area of Udorthents, loamy, very deep, 0 to 8 percent slopes.

selected for a soil both on the soil map and in the soil descriptions of this report.

Lawn Grasses

The City of Baltimore is in the heart of the crabgrass belt, the transition zone between the areas of adaptation of warm-season grasses and those of cool-season grasses. Neither kind of grass is well adapted to the area, but the turfgrower can grow both warm- and cool-season grasses. The following discussion covers several aspects of growing lawn grasses in the City of Baltimore.

Grasses for shaded areas. Two factors complicate growing turf in shade: lower light intensity, with its effect on physiological development, and competition of the trees for water and nutrients. The trees commonly restrict air movement or drainage and thereby create humid, disease-favoring conditions. And, shade moderates temperature.

Where the landscape plan calls for turf in shade, steps should first be taken to minimize the effect of shade by removing unnecessary trees, pruning the remaining trees to let in as much light as possible, immediately removing fallen leaves and branches, and otherwise practicing good management. This is especially necessary in the complexes with Urban land where many buildings cast much shade. Good management practices include using shade-tolerant grasses, minimizing additions of nitrogen when trees are in leaf but ensuring adequate nutrients for both trees and grass, maintaining nearly neutral soil reaction, irrigating deeply but infrequently, and, where needed, using fungicides.

Of the shade-tolerant grasses, red fescue is most tolerant and should be included in any grass mixture for shaded conditions. Pennlawn red fescue is one of the better shade grasses. Chewing fescue is slightly less tolerant than red fescue. In the climatic transition zone, Kentucky bluegrass is favored by open shade and should also be included in any mixture for use in shade. When two or more bluegrasses are to be included, one should be selected for shade tolerance and resistance to powdery mildew. A-34, Aquila, Delta, Glade, Parade, and Sydsport are varieties of Kentucky bluegrass that have demonstrated these characteristics.

Grasses for sunny locations. In full sun the problems of the transition zone are most apparent. A wide range of grasses can be grown, including warm-season bermudagrass and zoysia and cool-season bluegrasses, bentgrasses, fine fescue, and coarse fescue.

Bermudagrass and zoysia grow well in full sun in summer. If these grasses are properly managed, winter survival is seldom a problem; however, winter dormancy causes these grasses to turn brown for about 6 months each year. Although intolerant of foot traffic during this period, they can be overseeded with ryegrass for limited winter use.

Where summer use and reflected heat from adjacent buildings or pavement are not excessive, bluegrass grows well. A mixture will produce best results; no more than half the mixture should be red fescue; the rest should be two or three varieties of bluegrass.

Kentucky-31 tall fescue is particularly well adapted to this area. It is resistant to most diseases and insects. It tolerates the summer heat better than other cool-season grasses; and it does not have the long winter dormancy of warm-season grasses. Kentucky-31 tall fescue is one of few grasses that will grow and not be crowded out in soil planted to common bermudagrass. Kentucky-31 tall fescue is coarse-textured and too coarse for some uses and tastes. It also is a bunchgrass; if the turf of Kentucky-31 tall fescue is injured, recovery is very slow. A mixture of Kentucky-31 tall fescue and 5 to 20 percent Kentucky bluegrass sown at a high rate (5 pounds per 1,000 square feet) provides the best appearance.

Grasses for visual effect. Lawns maintained for visual effect can be divided into two groups: those seen from a low angle while moving or from a distance and those seen from a high angle at close range. For the first group, any species that can be mowed and that can control erosion is satisfactory. In the second group is the generally small, picture lawn in which every blade of grass can be seen. Traffic is usually minimal on these lawns. In full sun, where high temperatures are anticipated, zoysia and the more slowly growing turf varieties of bermudagrass are

recommended. Colorants can be applied to provide greenness during winter. For other show areas bluegrass and red fescue may be recommended for sun or partial shade.

Grasses for heavy use areas. Traffic causes problems by directly damaging the grass plants and by indirectly compacting the soil, thereby excluding air and water from the roots.

One of the most common high traffic areas is the path. These areas can be paved as a small walkway, possibly with stepping stones or gravel, or redesigned to guide traffic naturally to use of existing paved walks. In relatively sheltered locations where soil blowing is not a problem, wood chips can be used.

Larger areas, such as ballparks and play areas, where turf is desired, require wear-resistant grass and soil treatment to withstand the effects of compaction.

Only two grasses are suitable for these heavy duty areas: Kentucky-31 tall fescue for all-weather use and Turfcote, or U-3 bermudagrass, where primary use will occur in warm weather. Either one is necessary to maintain the reaction near neutral, maintain adequate levels of phosphate and potash, and provide moderate amounts of nitrogen for vigorous, but not lush, growth. Best management practices are soil amendments, which are discussed above in the section "Soil Amendments," and vertical slicing and aeration, which physically loosen and aerate the soil.

Woodland Management and Productivity

Woodlands are concentrated in parks but are also scattered throughout the city in small, unmanaged lots. They cover about 7,300 acres, or 14 percent of the land acres, in the City of Baltimore. Most woodlands are located on steep soils that border streams, in undeveloped areas of somewhat poorly drained and poorly drained soils on uplands, and on flood plains in the city's protected parklands.

As the City of Baltimore develops open areas, woodland is becoming increasingly important to recreation, stormwater runoff, and flood control. Trees add natural beauty to the landscape and provide a more desirable environment for city dwellers. Woodlands also increase infiltration of rain into the soil and decrease stormwater runoff into the city's overburdened streams and storm drains. Consequently, a need exists to preserve and improve management of existing woodlands and to plant new stands where space is available.

Suitable kinds of trees to plant and to favor in existing woodland depends, to a great extent, on drainage of the soils. Some trees grow well only on well drained or moderately well drained soils. Others grow best in moist areas.

Information on woodland management is available from the Forest, Park and Wildlife Service of the Maryland Department of Natural Resources; the Cooperative Extension Service; and the Natural Resources Conservation Service.

Table 5 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; *L*, low strength; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, L, and N.

In table 5, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict

equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table, the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Recreation

In 1988 the City of Baltimore comprised more than 5,000 acres of public open space. The National Park Service manages the Fort McHenry National Monument; the City of Baltimore, Bureau of Parks and Bureau of Recreation, manage the rest. The largest public parks in the City of Baltimore are Druid Hill Park, Leakin Park, Gwynns Falls Park, Herring Run Park, Cylburn Arboretum, Patterson Park, and Bay Brook Park. The city-owned public golf courses are Forest Park, Clifton Park, Mount Pleasant Park, and Carroll Park. Numerous, smaller parks in various shapes are scattered throughout the city (fig. 10).

The parkland and open space of the City of Baltimore contain diverse soils and other resources. A knowledge of soils is needed in planning, developing, and maintaining areas for open space and recreation.

The soils of the survey area are rated in table 6 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 6, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 6 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9

Figure 10.—Open space, such as this park, consists of a diversity of soils and other natural resources.

and interpretations for dwellings without basements and for local roads and streets in table 8.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

The City of Baltimore offers a wide range of animal life in an area that is mostly urban. Wildlife abundance and distribution depends on the presence of large parklands and open space. More than 10 percent of the land area in the city is wooded parkland. The largest parks are Leakin Park, Gwynns Falls Park, Cylburn Arboretum, Druid Hill Park, and Herring Run Park. A connection between these natural areas and companion parks in surrounding areas allows the movement of species.

Throughout the city gray squirrels are abundant and represent the most visible diurnal mammal. In parklands

the common nocturnal species, raccoon and opossum, often invade residential communities in search of food. Red and gray foxes are fairly rare, and likely breed in scattered city locations. White-tailed deer are returning in small numbers. Numerous other small mammals, including cottontail rabbits, muskrat, native rodents, and bats, inhabit many places where the necessary food and habitat are available.

Large and small parklands also support a wide variety of terrestrial birds. The larger species, such as the pileated woodpecker and barred owl, are permanent residents. Broad-winged hawks nest in the larger forested parks, and red-tailed hawks regularly visit these parks in winter. Soaring black and turkey vultures are scattered throughout the city. Bobwhite quail are frequently heard or seen in openland habitats. During migration and in winter numerous species of waterfowl, gulls, and shore birds concentrate along the Northwest and Middle Branches of the Patapsco River and along Curtis Creek.

The current status of many reptiles and amphibians is not fully determined, but some frogs and smaller snakes seem to be withstanding urban pressure. Local streams and rivers also support catfish, sunfish, carp, some bass, and, during the spring migration season, abundant hickory shad.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 7, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild

herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations

are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 9 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and

liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 9 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. Table 12 shows engineering index properties, and provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more

than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 10, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A

high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 15.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 12.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074

millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 13 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads; and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6

percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 13, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 14 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Table 14 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and

frequent that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 14 are the depth to the seasonal high water table; the kind of water table—that is, perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 14.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(20)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(23)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(20)* and in "Keys to Soil Taxonomy" *(22)*. Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Baile Series

The Baile series consists of very deep, poorly drained soils on upland depressions and foot slopes on the Piedmont Plateau. These soils formed in local alluvium from acid crystalline rocks and are underlain by bedrock. Slopes range from 0 to 8 percent.

Soils of the Baile series are fine-loamy, mixed, mesic Typic Ochraquults.

Typical pedon of Baile loam, in an area of Baile-Urban land complex, 0 to 8 percent slopes, about 0.25 mile north of Northern Parkway and 2,000 feet west of Roland Road in Roland Park, in a community garden:

A—0 to 6 inches; very dark grayish brown (10YR 3/2)

loam; moderate medium granular structure; friable, nonsticky and slightly plastic; many very fine and fine roots; neutral; gradual smooth boundary.

E—6 to 18 inches; dark grayish brown and grayish brown (10YR 4/2 and 10YR 5/2) loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, nonsticky and slightly plastic; many very fine and fine roots; slightly acid; gradual smooth boundary.

Btg—18 to 35 inches; light brownish gray (10YR 6/2) clay loam; common, coarse, distinct dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on peds and in pores; few very fine and fine roots; slightly acid; clear smooth boundary.

Cg1—35 to 50 inches; mixed light gray, light brownish gray and brown (10YR 7/2, 10YR 6/2, and 10YR 5/3) sandy loam; massive; friable, nonsticky and slightly plastic; neutral; gradual wavy boundary.

Cg2—50 to 65 inches; dark yellowish brown, light gray, and light brownish gray (10YR 4/6, 10YR 7/2, and 10YR 6/2) sandy loam that has a few lenses of loamy sand; massive; friable, nonsticky and nonplastic; neutral.

The thickness of the solum ranges from 24 to 40 inches. Depth to bedrock is more than 60 inches. The soil is strongly acid to extremely acid where unlimed.

The A horizon has a hue of 10YR, value of 3 or 4, and chroma of 2.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 2. It has few to many, distinct mottles. Texture is loam or silt loam.

The Btg horizon has a hue of 10YR, value of 4 to 6, and chroma of 2. It has few to many, fine, medium, and coarse, distinct mottles. Texture is silt loam, silty clay loam, or clay loam.

The Cg horizon has a hue of 10YR, value of 4 to 7, and chroma of 2 to 6. High chroma mottles are so prevalent that matrix color was difficult to determine. In some pedons the C horizon is strongly gleyed. Texture is silt loam, loam, or sandy loam that has lenses of loamy sand in some profiles below a depth of 50 inches.

Beltsville Series

The Beltsville series consists of very deep, moderately well drained soils on broad uplands on the Coastal Plain. These soils formed in loamy, old, alluvial sediments. Slopes range from 0 to 15 percent.

Soils of the Beltsville series are fine-loamy, mixed, mesic Typic Fragiudults.

Typical pedon of Beltsville loam, in an area of Beltsville-Urban land complex, 0 to 8 percent slopes, about 90 feet southwest of the corner of Springfield and Adrian Streets, in Waverly, in a vacant lot:

Ap—0 to 12 inches; very dark grayish brown (2.5Y 3/2) loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; slightly acid; gradual smooth boundary.

BE—12 to 20 inches; yellowish brown (10YR 5/6 and 10YR 5/4) silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; strongly acid; gradual smooth boundary.

Bt—20 to 24 inches; light olive brown (2.5Y 5/4) silt loam; moderate coarse angular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on ped faces of peds; few fine roots; very strongly acid; clear smooth boundary.

Bx—24 to 45 inches; brownish yellow (10YR 6/6) silt loam that has thin lenses of sandy loam; common medium distinct yellowish brown and light brownish gray (10YR 5/8 and 10YR 6/2) mottles; strong very coarse prismatic structure; firm, nonsticky and nonplastic; very strongly acid; gradual smooth boundary.

C—45 to 65 inches; mixed yellowish brown and strong brown (10YR 5/8 and 7.5YR 5/6) sandy loam; massive; slightly firm, nonsticky and nonplastic; 10 percent fine rounded quartzite gravel; strongly acid.

The thickness of the solum ranges from 40 to 64 inches. Depth to a fragipan ranges from 12 to 34 inches. Coarse fragment content ranges from 0 to 5 percent fine quartzite gravel in the solum and 10 to 20 percent fine gravel in the C horizon. The soil is strongly acid to extremely acid where unlimed.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 to 4.

The BE and Bt horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. Texture is silt loam or silty clay loam.

The Bx horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Texture is silt loam, loam, or clay loam.

The C horizon has variegations of many colors with hues ranging from 7.5YR to 2.5Y. It is stratified with textures ranging from sandy loam to clay loam.

Brandywine Series

The Brandywine series consists of very deep, somewhat excessively drained soils on side slopes, ridges, and knolls on the Piedmont Plateau. These soils formed in material weathered from gneiss and other related acid crystalline rocks. Slopes range from 0 to 60 percent.

Soils of the Brandywine series are sandy-skeletal, mixed, mesic Typic Dystrochrepts.

Typical pedon of Brandywine loam, 15 to 60 percent slopes, about 2,000 feet west of St. Joseph Manor House, in Roland Park, in an open field:

Ap—0 to 6 inches; dark brown (10YR 4/3) loam; weak medium granular structure; friable, nonsticky and nonplastic; many very fine and fine roots; 10 percent fine angular gravel of decomposed gneiss and quartzite; strongly acid; gradual smooth boundary.

Bw—6 to 19 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 10 percent fine angular gravel of decomposed gneiss and quartzite; strongly acid; gradual smooth boundary.

C1—19 to 25 inches; yellowish brown (10YR 5/6) very gravelly loamy sand; single grain; loose; 50 percent very fine gravel of decomposed gneiss; strongly acid; gradual smooth boundary.

C2—25 to 65 inches; dark yellowish brown (10YR 4/6) extremely gravelly coarse sand; single grain; loose; 60 percent very fine angular gravel of decomposed gneiss; strongly acid.

The thickness of the solum ranges from 12 to 30 inches. The depth to bedrock is 60 inches or more. The rock fragment content ranges from 0 to 15 percent in the surface layer, 5 to 35 percent in the solum, and 40 to 90 percent in the C horizon. The soil is strongly acid to extremely acid where unlimed.

The A or Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 to 4.

The Bw horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 or 6. Texture is loam, sandy loam, or gravelly loam. Some pedons have a BC horizon that is similar in color to the Bw horizon and is very gravelly coarse sand to loamy sand.

The C horizon is often variegated with hue of 7.5YR to 5Y, value of 4 to 8, and chroma of 2 to 8. Colors are inherent in the rock material and not caused by wetness. The C horizon is highly fractured and crushes easily to very gravelly or extremely gravelly loamy sand, very gravelly or extremely gravelly sand, or very gravelly or extremely gravelly coarse sand.

Chester Series

The Chester series consists of very deep, well drained soils on broad ridges and side slopes on the Piedmont Plateau. These soils formed in material weathered from micaceous schist and gneiss. Slopes range from 0 to 8 percent.

Soils of the Chester series are fine-loamy, mixed, mesic Typic Hapludults.

Typical pedon of Chester loam, in an area of Chester-Urban land complex, 0 to 8 percent slopes, about 100 feet east from the intersection of Hollen Road and Sycamore Road, in Cedarcroft, in a landscaped yard:

A—0 to 2 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; many very fine and fine roots; 2 percent gravel; slightly acid; clear smooth boundary.

E—2 to 8 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine roots; very strongly acid; clear smooth boundary.

Bt1—8 to 30 inches; strong brown (7.5YR 5/8) clay loam; moderate medium angular blocky structure; friable, slightly sticky and plastic; many faint and few distinct clay films on faces of peds; common very fine and fine roots; very strongly acid; gradual smooth boundary.

Bt2—30 to 38 inches; strong brown (7.5YR 5/6) loam; weak medium angular blocky structure; friable, slightly sticky and slightly plastic; many distinct clay films on faces of peds; few very fine and fine roots; very strongly acid; clear wavy boundary.

C—38 to 65 inches; mixed brownish yellow, light yellowish brown, and yellowish brown (10YR 6/6, 10YR 6/4, and 10YR 5/8) loam; massive; friable, slightly sticky and slightly plastic; very strongly acid.

The thickness of the solum ranges from 30 to 50 inches. Depth to bedrock is 6 feet or more. The soil is strongly acid to very strongly acid where unlimed.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 to 4.

The E horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. Texture is loam or silt loam.

The Bt horizon has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, clay loam, or silty clay loam.

The C horizon has hue of 10YR to 2.5YR, value of 3 to 8, and chroma of 1 to 8. It is dominantly reddish and variegated. Texture is loam, silt loam, or sandy loam.

Christiana Series

The Christiana series consists of very deep, well drained soils on broad ridges and side slopes on the Coastal Plain. These soils formed in a thin mantle of silty material over much older deposits of plastic clay. Slopes range from 0 to 15 percent.

Soils of the Christiana series are clayey, kaolinitic, mesic Typic Paleudults.

Typical pedon of Christiana loam, in an area of Christiana-Urban land complex, 8 to 15 percent slopes, about 250 feet north of northern entrance to Arundel Elementary School, in Cherry Hill, in a wooded area:

A—0 to 3 inches; very dark brown (10YR 3/1) loam; moderate medium granular structure; friable, nonsticky and slightly plastic; many very fine and fine roots; moderately acid; abrupt smooth boundary.

E—3 to 11 inches; yellowish red (5YR 4/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; strongly acid; abrupt smooth boundary.

Bt1—11 to 27 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; common prominent clay films; common fine roots; very strongly acid; clear smooth boundary.

Bt2—27 to 46 inches; red and strong brown (2.5YR 4/6 and 7.5YR 5/8) clay; very firm, very sticky and very plastic; common prominent clay films; very strongly acid; clear smooth boundary.

Bt3—46 to 56 inches; yellowish red (5YR 4/6 and 5YR 5/8) clay; firm, very sticky and very plastic; common prominent clay films; very strongly acid; abrupt smooth boundary.

C—56 to 65 inches; yellowish red and strong brown (5YR 4/6 and 7.5YR 4/6) silty clay; friable, sticky and plastic; very strongly acid.

The thickness of the solum ranges from 55 to 84 inches. The soil is strongly acid to extremely acid where unlimed.

The A horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 1 to 4.

The E horizon has hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam or loam.

The Bt horizon has hue of 5YR to 10R, value of 3 to 5, and chroma of 4 to 8. In some pedons it is variegated. Texture is clay loam, clay, or silty clay, and averages more than 35 percent clay. Clay loam is only in the upper part of the horizon.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 to 8, and chroma of 2 to 8. It is variegated in most pedons. Texture is clay or silty clay.

Elkton Series

The Elkton series consists of very deep, poorly drained soils on upland flats and depressions on the Coastal Plain. These soils formed in clayey sediments. Slopes range from 0 to 5 percent.

Soils of the Elkton series are fine-silty, mixed, mesic Typic Ochraquults.

Typical pedon of Elkton silt loam, in an area of Elkton-Urban land complex, 0 to 5 percent slopes, about 35 feet northeast of the northwest corner of the Montgomery Ward Building complex, on a driving range at the Carroll Golf Course:

A—0 to 5 inches; very dark gray (10YR 3/1) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

E—5 to 14 inches; brown (10YR 5/3) silty clay loam; many medium prominent light gray and dark reddish brown (10YR 7/2 and 5YR 3/4) mottles; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; slightly acid; clear smooth boundary.

Btg—14 to 32 inches; light brownish gray (10YR 6/2) silty clay; many medium prominent light gray and dark reddish brown (10YR 7/2 and 5YR 3/4) mottles; moderate coarse angular blocky structure; firm, very sticky and very plastic; many faint and distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

BCg2—32 to 45 inches; light brownish gray (10YR 6/2) silty clay loam; many medium prominent light gray and dark reddish brown (10YR 7/2 and 5YR 3/4) mottles; massive; firm, sticky and plastic; strongly acid; abrupt smooth boundary.

Cg1—45 to 65 inches; olive gray (5Y 4/2) silty clay; common coarse prominent light brownish gray (10YR 6/2) mottles; massive; firm, very sticky and very plastic; strongly acid; abrupt smooth boundary.

Cg2—65 to 70 inches; gray (10YR 6/2) very fine sandy loam; massive; friable, slightly sticky, slightly plastic; strongly acid.

The solum is 30 to 50 inches thick. Rock fragments of smooth, fine, quartzite gravel range from 0 to 2 percent throughout. The soil is strongly acid to extremely acid where unlimed.

The A horizon has hue of 10YR to 2.5Y, value of 3 or 4, and chroma of 1 to 3. Distinct or prominent mottles are in the lower part of the A horizon.

The E horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 1 to 3. It has distinct or prominent mottles in shades of gray or brown. Texture is silt loam or silty clay loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It has distinct or prominent mottles in shades of gray or brown. Texture is silty clay or silty clay loam with a weighted average of less than 35 percent clay.

The BCg horizon, where present, and the Cg horizon have similar colors to those of the Btg horizon. Texture ranges from very fine sandy loam to silty clay.

Galestown Series

The Galestown series consists of very deep, somewhat excessively drained soils on uplands on the Coastal Plain. These soils formed in sandy fluvial and alluvial sediments. Slopes range from 0 to 8 percent.

Soils of the Galestown series are sandy, siliceous, mesic Psammentic Hapludults.

Typical pedon of Galestown loamy sand, 0 to 8 percent slopes, about 250 feet west of Fort Smallwood Road at the Baltimore City-Anne Arundel County line, in a wooded, undeveloped area:

A—0 to 7 inches; dark brown (10YR 3/3) loamy sand; single grain; loose; many very fine and fine roots; very strongly acid; abrupt wavy boundary.

E—7 to 23 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; few fine to coarse roots; very strongly acid; clear wavy boundary.

BE—23 to 28 inches; yellowish brown (10YR 5/4) loamy sand; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few very fine to medium roots; very strongly acid; clear wavy boundary.

Bt—28 to 50 inches; strong brown (7.5YR 5/6) loamy sand as 1- to 5-inch thick lamellae alternating with layers of yellowish brown (10YR 5/6) sand; lamellae have moderate fine subangular blocky structure; very friable; common faint clay coatings on sand grains and few faint clay bridges; sand layers are single grain; loose; very strongly acid; abrupt smooth boundary between layers.

C—50 to 65 inches; yellowish brown (10YR 5/6) sand; single grain; loose; thin layers of lamellae; very strongly acid.

The thickness of the solum varies because of the lamellae and ranges from 45 to 72 inches. In unlimed areas reaction is very strongly acid or extremely acid.

The A horizon has hue of 10YR, value of 3, and chroma of 1 to 3.

The E or BE horizon, where present, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Texture is loamy sand.

The Bt horizon consists of thin lamellae exceeding 6 inches in aggregate and having hue of 5YR to 10YR, value of 4 or 5, and chroma of 6. Texture is loamy sand.

The C horizon is interlayered with lamellae and has hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 4 to 6. Texture is sand or loamy sand.

Jackland Series

The Jackland series consists of very deep, moderately well drained and somewhat poorly drained soils on upland flats, foot slopes, and depressions on the Piedmont Plateau. These soils formed in material weathered from mixed mafic rocks. Slope ranges from 0 to 8 percent.

Soils of the Jackland series are fine, montmorillonitic, mesic Aquic Hapludalfs.

Typical pedon of Jackland silt loam, 0 to 3 percent slopes, about 200 feet northwest of the corner of Kennison Avenue and Bowers Avenue, in Park Heights, in a wooded area:

A—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine and fine roots; 5 percent cobbles; moderately acid; clear smooth boundary.

Bt1—8 to 29 inches; brown (10YR 5/3) clay; many medium prominent yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; weak medium angular blocky structure; firm, sticky and very plastic; few faint and distinct clay films; few fine roots; 2 percent angular gravel; neutral; gradual smooth boundary.

Bt2—29 to 41 inches; brown (10YR 5/3) clay; many medium prominent light gray (5Y 6/1) and strong brown (7.5YR 5/6) mottles; weak medium angular blocky structure; firm, sticky and plastic; many faint and distinct clay films; 2 percent angular gravel; slightly alkaline; gradual smooth boundary.

C—41 to 65 inches; dark yellowish brown (10YR 4/6) clay loam; many medium prominent gray (10YR 5/1) mottles; massive; friable, slightly sticky and slightly plastic; 2 percent angular gravel; neutral.

The thickness of the solum ranges from 30 to 48 inches. The depth to bedrock is 60 inches or more. Rock fragment content ranges from 0 to 15 percent in the A and B horizons and as much as 30 percent in the C horizon. In unlimed areas the soil is very strongly acid to moderately acid in the surface layer and very strongly acid to moderately alkaline in the rest of the profile.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 to 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It has many, fine and medium, prominent mottles of chroma of 2 or less. Texture is clay.

The C horizon is commonly variegated in shades of brown, yellow, white, green, and black. Texture is sandy clay loam or clay loam. Some pedons have fragments of saprolite.

Joppa Series

The Joppa series consists of very deep, somewhat excessively drained soils on level uplands, side slopes, and ridges on the Coastal Plain. These soils formed in

sandy and very gravelly material. Slopes range from 0 to 60 percent.

Soils of the Joppa series are loamy-skeletal, siliceous, mesic Typic Hapludults.

Typical pedon of Joppa gravelly sandy loam, in an area of Joppa-Urban land complex, 8 to 15 percent slopes, about 100 feet southeast of Seagull Road and 150 feet northeast of Cherryland Road, in an open space with scattered pines:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine and fine roots; 15 percent fine rounded gravel; moderately acid; clear smooth boundary.

A2—2 to 10 inches; dark brown (10YR 3/3) gravelly sandy loam, pale brown (10YR 6/3) dry; very weak fine granular structure; very friable, nonsticky and nonplastic; many very fine and fine roots; 35 percent fine rounded gravel; strongly acid; gradual smooth boundary.

E—10 to 16 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; common fine roots; 35 percent fine rounded gravel; strongly acid; gradual smooth boundary.

Bt—16 to 24 inches; strong brown (7.5YR 5/6) very gravelly sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few very faint clay films on faces of peds; few fine roots; 35 percent fine rounded gravel; strongly acid; clear smooth boundary.

C1—24 to 38 inches; reddish yellow (7.5YR 6/6) very gravelly sand; single grain; loose; few fine roots; 35 percent fine rounded gravel; strongly acid; clear smooth boundary.

C2—38 to 46 inches; reddish yellow (7.5YR 8/6 and 7.5YR 7/6) gravelly loamy sand; single grain; loose; 20 percent fine rounded gravel; very strongly acid; gradual smooth boundary.

C3—46 to 65 inches; reddish yellow (7.5YR 7/6 and 7.5YR 6/6) gravelly sandy loam; massive; friable, nonsticky and nonplastic; 20 percent fine rounded gravel; extremely acid.

The thickness of the solum ranges from 20 to 40 inches. Gravel content ranges from 15 to 35 percent in the A and E horizons, 35 to 60 percent in the Bt horizon, and 0 to 70 percent in the C or 2C horizon. The soil is strongly acid to extremely acid where unlimed.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 to 3.

The E horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. Texture is gravelly sandy loam, gravelly loamy sand, or gravelly loam.

The Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. Texture is very gravelly sandy loam or very gravelly loam.

The C horizon has variegated hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. Texture is very gravelly sand, gravelly loamy sand, or gravelly sandy loam.

The 2C horizon, where present, has variegated hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. Texture is stratified sand, loamy sand, or sandy loam.

Keyport Series

The Keyport series consists of very deep, moderately well drained soils on upland foot slopes on the Coastal Plain. These soils formed in moderately fine textured, old fluvial sediments underlain by older deposits of silty clay. Slopes range from 0 to 15 percent.

Soils of the Keyport series are clayey, mixed, mesic Aquic Hapludults.

Typical pedon of Keyport loam, 0 to 8 percent slopes, about 50 feet north of connecting cemetery roads, 0.25 mile northwest of mausoleum on Wilkens Avenue, in Loudon Park Cemetery, in a wooded, undeveloped area:

A—0 to 4 inches; dark brown (10YR 3/3) loam; moderate medium granular structure; very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; slightly acid; clear smooth boundary.

Bt1—4 to 12 inches; mixed dark grayish brown and strong brown (10YR 4/2 and 7.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable, sticky and slightly plastic; few faint clay films on faces of peds; common very fine and fine roots; moderately acid; abrupt smooth boundary.

Bt2—12 to 21 inches; variegated yellowish red and pale brown (5YR 4/6 and 10YR 6/3) clay; strong fine angular blocky structure; firm, sticky and plastic; many faint clay films on faces of peds; few very fine and fine roots; very strongly acid; abrupt smooth boundary.

Bt3—21 to 48 inches; variegated yellowish red and pale brown (5YR 4/6 and 10YR 6/3) clay; many coarse distinct light brownish gray and dark yellowish brown (10YR 6/2 and 10YR 4/6) mottles; strong fine angular blocky structure; firm, sticky and plastic; many faint clay films on faces of peds; few very fine and fine roots; very strongly acid; abrupt smooth boundary.

C—48 to 65 inches; mixed brownish yellow and light gray (10YR 6/8 and 10YR 7/2) clay; massive; firm, sticky and plastic; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Depth to unconforming, coarser materials is typically more than 5 feet. Reaction is strongly acid to extremely acid in unlimed areas.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 1 to 8. The horizon has distinct mottles between 20 and 30 inches. Texture is silty clay loam, silty clay, or clay.

The C horizon has variegated hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 to 8. Texture is clay loam or clay but ranges to loamy sand in some pedons. Thin sheets of ironstone form in vertical and horizontal fracture plates of the C horizon in some pedons. Iron pyrite nodules also appear in some pedons.

Legore Series

The Legore series consists of very deep, well drained soils on broad ridges and side slopes on the Piedmont Plateau. These soils formed in material weathered from amphibolite, diabase, diorite, or similar, basic igneous rocks. Slopes range from 0 to 50 percent.

Soils of the Legore series are fine-loamy, mixed, mesic Ultic Hapludalfs.

Typical pedon of Legore loam, 8 to 15 percent slopes, about 90 feet west of the corner of Fairbanks Road and Poplin Avenue, in Mount Washington, in an undisturbed wooded area:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; neutral; clear smooth boundary.

E—4 to 12 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; moderately acid; gradual smooth boundary.

Bt—12 to 22 inches; strong brown (7.5YR 4/6) clay loam; moderate medium angular blocky structure; friable to firm, sticky and plastic; continuous faint clay films on peds; many very fine and fine and common medium roots; strongly acid; clear smooth boundary.

C1—22 to 42 inches; strong brown (7.5YR 4/6) loam; massive; friable, slightly sticky and slightly plastic; common fine and medium roots; moderately acid; gradual smooth boundary.

C2—42 to 55 inches; strong brown (7.5YR 4/6) loam; massive; friable, nonsticky and slightly plastic; few fine roots; moderately acid; gradual smooth boundary.

C3—55 to 65 inches; dark brown (7.5YR 4/4) loam; massive with rock structure in places; friable, nonsticky and slightly plastic; slightly acid.

The thickness of the solum ranges from 20 to 34 inches. Depth to bedrock ranges from 5 to 10 feet. Rock fragment content ranges from 0 to 35 percent. Stones and boulders are in some pedons. In unlimed areas the soil is slightly acid to strongly acid in the solum and slightly acid to moderately acid in the substratum.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4.

The E horizon, where present, has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4. Texture is loam.

The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 6. Texture is loam or clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. Texture is sandy loam, loam, or silt loam.

Leonardtown Series

The Leonardtown series consists of deep, poorly drained soils on upland depressions on the Coastal Plain. These soils formed in a silty mantle over older, coarse textured, fluvial sediments. Slopes range from 0 to 8 percent.

Soils of the Leonardtown series are fine-silty, mixed, mesic Typic Fragiaquults.

Typical pedon of Leonardtown silt loam, 0 to 8 percent slopes, about 550 feet east of the northwest corner of the Wilkens Street section of the Loudon Park Cemetery, 50 feet east of the creek and 30 feet north of railroad tracks, in a wooded area:

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine roots; strongly acid; clear smooth boundary.

E—5 to 15 inches; yellowish brown (10YR 5/4) silt loam; few fine faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual smooth boundary.

Bt—15 to 30 inches; gray (10YR 6/1) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable, slightly sticky and plastic; few faint clay films on faces of peds; few very fine and fine roots; very strongly acid; abrupt smooth boundary.

Btx1—30 to 36 inches; light gray (10YR 7/1) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic and medium platy structure; firm, slightly sticky and

slightly plastic; few very faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

Btx2—36 to 50 inches; dark yellowish brown (10YR 4/6) silty clay loam; many medium prominent light gray and gray (10YR 7/2 and 10YR 6/1) mottles; moderate very coarse prismatic and medium platy structure; firm, slightly sticky and slightly plastic; few faint clay films on faces of peds; strongly acid; abrupt smooth boundary.

2C—50 to 55 inches; light brownish gray (10YR 6/2) loam; common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable, slightly sticky and slightly plastic; slightly acid.

The thickness of the solum ranges from 28 to 50 inches. The depth to the fragipan ranges from 12 to 30 inches. Coarse fragment content ranges from 0 to 10 percent fine quartzite gravel in the solum and 0 to 20 percent fine gravel in the C horizon. The soil is extremely acid to strongly acid in unlimed areas.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 to 3.

The E horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 or 6. Faint mottles are in the lower part of the horizon. Texture is loam or silt loam.

The Bt and Btx horizons have hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 6. Distinct and prominent mottles in shades of gray and brown are throughout the horizons. Texture is silt loam or silty clay loam. The Bx horizon is firm and has platy or prismatic structure.

The 2C horizon has color similar to that of the B horizon. Texture is loam, silt loam, or sandy loam.

Manor Series

The Manor series consists of very deep, somewhat excessively drained soils on narrow ridges and side slopes on the Piedmont Plateau. These soils formed in material weathered from gneiss or micaceous schist. Slopes range from 0 to 50 percent.

Soils of the Manor series are coarse-loamy, micaceous, mesic Typic Dystrochrepts.

Typical pedon of Manor loam, 15 to 50 percent slopes, about 300 feet northeast of the corner of Matfeldt Road and Falls Road, in a wooded area:

A—0 to 7 inches; dark brown (7.5YR 3/2) loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; many mica flakes; 5 percent medium and fine angular gravel; moderately acid; clear smooth boundary.

Bw1—7 to 20 inches; strong brown (7.5YR 5/8) loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; few mica flakes; 5 percent medium and fine angular gravel; very strongly acid; gradual smooth boundary.

Bw2—20 to 35 inches; strong brown (7.5YR 5/8) loam; massive; friable, nonsticky and nonplastic; many mica flakes; very strongly acid; gradual smooth boundary.

C—35 to 65 inches; strong brown (7.5YR 5/6) loam; massive; friable, nonsticky and nonplastic; many mica flakes; 10 percent medium and fine angular gravel; strongly acid.

The thickness of the solum ranges from 15 to 35 inches. Depth to bedrock is 6 to 10 feet or more. Rock fragments of hard quartzite or flat schist range from 0 to 10 percent throughout the profile. The soil is moderately acid to extremely acid in unlimed areas. Mica content increases with depth in the profile.

The A horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 4.

The E horizon, where present, has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 4. Texture is loam or sandy loam.

The Bw horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. Texture is loam or sandy loam that is less than 18 percent clay. The increase in clay content is less than 1.2 times the percentage of clay in the A horizon.

The C horizon has similar colors to those of the Bw horizon. Texture is sometimes variegated. Texture is loam or sandy loam.

Matapeake Series

The Matapeake series consists of very deep, well drained soils on broad uplands and side slopes on the Coastal Plain. These soils formed in a silty mantle overlying firm, unconsolidated sediments. Slopes range from 0 to 8 percent.

Soils of the Matapeake series are fine-silty, mixed, mesic Typic Hapludults.

Typical pedon of Matapeake silt loam, in an area of Matapeake-Urban land complex, 0 to 8 percent slopes, about 100 feet west of Cherry Hill Road and 0.35 mile south of the corner of Cherry Hill Road and Waterview Avenue, in a wooded area:

A—0 to 4 inches; black (10YR 2/1) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine roots; moderately acid; abrupt smooth boundary.

E—4 to 15 inches; yellowish brown (10YR 5/6) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine and fine roots; strongly acid; clear smooth boundary.

Bt1—15 to 22 inches; strong brown (7.5YR 5/6) silty clay

loam; moderate medium subangular blocky structure; friable, sticky and slightly plastic; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—22 to 35 inches; strong brown (7.5YR 5/6) and light brown (7.5YR 6/4) silty clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

C1—35 to 45 inches; strong brown (7.5YR 5/6) silty clay loam; massive; firm, slightly sticky and plastic; very few faint clay films in pores; strongly acid; clear smooth boundary.

C2—45 to 65 inches; variegated strong brown (7.5YR 5/6), reddish yellow (7.5YR 6/6), and pink (7.5YR 7/4) silty clay loam; massive; very firm, slightly sticky and plastic; strongly acid.

The thickness of the solum ranges from 20 to 40 inches. Gravel content ranges from 0 to 1 percent in the solum. The soil is strongly acid to extremely acid in unlimed areas.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 1 to 4. Value is 2 or 3 only in a thin, undisturbed A horizon.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 6. Texture is loam or silt loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. Texture is silty clay loam or silt loam.

The C horizon has hue of 7.5YR or 5YR, value of 4 to 7, and chroma of 4 to 6. Texture is silty clay loam or silt loam.

These soils are a taxadjunct to the series because clay does not decrease in the lower part of the profile. This difference does not affect the use and management of the soils.

Mattapex Series

The Mattapex series consists of very deep, moderately well drained soils on broad uplands and poorly defined drainageways on the Coastal Plain. These soils formed in a mantle of silty sediments over older, coarser fluvial sediments. Slopes range from 0 to 8 percent.

Soils of the Mattapex series are fine-silty, mixed, mesic Aquic Hapludults.

Typical pedon of Mattapex silt loam, in an area of Mattapex-Urban land complex, 0 to 8 percent slopes, about 70 feet northeast of the corner of Herkimer Road and Parkman Road, at 2823 Georgetown Road in Morrell Park, in a landscaped backyard:

A—0 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, pale brown (10YR 5/2) dry; moderate medium granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; slightly acid; clear smooth boundary.

E—12 to 20 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine roots; moderately acid; gradual smooth boundary.

Bt1—20 to 32 inches; dark yellowish brown (10YR 4/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; few very fine and fine roots; very strongly acid; gradual smooth boundary.

Bt2—32 to 41 inches; yellowish brown (10YR 5/6) silt loam; common fine faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; few very fine and fine roots; very strongly acid; gradual smooth boundary.

2BC—41 to 48 inches; yellowish brown (10YR 5/4) sandy loam; many fine distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, nonsticky and slightly plastic; very strongly acid; gradual smooth boundary.

2C—48 to 65 inches; yellowish brown (10YR 5/6 and 10YR 5/4) sandy loam; massive; friable, nonsticky and nonplastic; very strongly acid.

The thickness of the solum ranges from 24 to 48 inches. The soil has 0 to 20 percent fine rounded quartzite gravel in the substratum. The soil is strongly acid to very strongly acid in unlimed areas.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4.

The E horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. Texture is silt loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It has mottles in shades of brown. Texture is silt loam or silty clay loam.

The 2BC horizon, where present, and the 2C horizon have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 6. Texture is loam, sandy loam, or loamy fine sand.

Montalto Series

The Montalto series consists of very deep, well drained soils on broad ridges, shoulders, and side slopes on the Piedmont Plateau. These soils formed in material weathered from basic igneous rocks, mostly diabase and amphibolite. Slopes range from 0 to 15 percent.

Soils of the Montalto series are fine, mixed, mesic Ultic Hapludalfs.

Typical pedon of Montalto silt loam, 0 to 8 percent slopes, about 350 feet northwest of the corner of Seton Drive and Metro Drive, in Seton Business Park, near the entrance to a hospital, in a landscaped area:

A—0 to 6 inches; dark reddish brown (5YR 3/4) silt loam; strong fine granular structure; very friable, slightly sticky and slightly plastic; many very fine and fine roots; moderately acid; clear smooth boundary.
BE—6 to 18 inches; dark reddish brown (2.5YR 3/4) silt loam; moderate fine angular blocky structure; friable, slightly sticky and slightly plastic; many very fine and medium roots; strongly acid; clear smooth boundary.
Bt1—18 to 24 inches; dark red (2.5YR 3/6) clay; strong medium angular blocky structure; very firm, very sticky and very plastic; common fine and medium roots; continuous faint clay films on faces of peds; moderately acid; clear smooth boundary.
Bt2—24 to 32 inches; red (2.5YR 4/6) clay loam; moderate coarse angular blocky structure; firm, sticky and slightly plastic; common fine roots; continuous faint clay films on faces of peds; moderately acid; gradual smooth boundary.
BC—32 to 42 inches; yellowish red (5YR 4/6) silty clay loam; weak coarse angular blocky structure; friable, sticky and slightly plastic; few fine roots; moderately acid; gradual smooth boundary.
C1—42 to 52 inches; red (2.5YR 4/6) loam; weak coarse angular blocky structure; firm, slightly sticky and slightly plastic; very strongly acid; gradual smooth boundary.
C2—52 to 65 inches; mixed strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) loam; weak coarse angular blocky structure; friable to extremely firm, slightly sticky and slightly plastic; 35 percent of horizon is thin layers and pockets of saprolite; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is 60 inches or more. Rock fragments, ranging from gravel to boulders, are in some pedons but do not exceed 30 percent by volume in any horizon. In some pedons stones cover as much as 3 percent of the surface. The soil is slightly acid to very strongly acid in unlimed areas.

The A horizon has hue of 7.5YR or 5YR, value of 3 or 4, and chroma of 2 or 4.

The BE horizon has hue of 7.5YR to 2.5YR, value of 3 to 5, and chroma of 4 to 6. Texture is silt loam, clay loam, or silty clay loam.

The Bt horizon has hue of 7.5YR to 2.5YR, value of 3 to 5, and chroma of 4 to 6. Texture is clay, silty clay, clay loam, or silty clay loam that is, on average, more than 35 percent clay.

The C horizon has variegated hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 6. Texture is loam, clay loam, or silty clay loam.

Relay Series

The Relay series consists of deep or very deep, well drained soils on narrow ridges and side slopes on the Piedmont Plateau. These soils formed in material weathered from mixed mafic rocks. Stones cover 3 percent of the surface. Slopes range from 0 to 60 percent.

Soils of the Relay series are fine-loamy, mixed, mesic Typic Hapludalfs.

Typical pedon of Relay silt loam, 15 to 60 percent slopes, very stony, about 200 feet northwest of turnaround on the dead end of Bearclift Road, in Gwynns Falls Park, in a wooded area:

Oe—1/2 inch to 0; black, partly decomposed leaves and twigs.
A—0 to 6 inches; very dark grayish brown (2.5Y 3/2) silt loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; 5 percent cobbles; moderately acid; clear smooth boundary.
E—6 to 15 inches; olive brown (2.5Y 4/4) silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; 2 percent angular gravel; moderately acid; gradual smooth boundary.
Bt1—15 to 30 inches; olive brown (2.5Y 4/4) silt loam; moderate medium subangular blocky structure; friable, slightly sticky and plastic; few faint clay films on faces of peds; common very fine, fine, medium, and coarse roots; 2 percent angular gravel; moderately acid; gradual wavy boundary.
BC—30 to 40 inches; dark yellowish brown (10YR 4/4) loam; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; 2 percent angular saprolitic gravel; strongly acid; clear wavy boundary.
C—40 to 65 inches; olive (5Y 4/4) sandy loam; massive; firm, nonsticky and nonplastic; few fine roots; inherent rock structure in some places; neutral.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is from 5 to 7 feet. In unlimed areas the soil is moderately acid to very strongly acid in the solum and moderately acid to neutral in the substratum. Rock fragments ranging from gravel to boulders range from 0 to 15 percent in individual horizons throughout the soil.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 to 4.

The E horizon, where present, has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Texture is loam or silt loam.

The Bt horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 3 to 6. Texture is silt loam, loam, or silty clay loam.

The BC and C horizons have hue of 10YR, 2.5Y, 5Y, or 5G, value of 3 to 7, and chroma of 2 to 6. Most pedons have abrupt differences in texture ranging from silt loam to sandy loam.

Sassafras Series

The Sassafras series consists of very deep, well drained soils on level uplands, side slopes, and ridges on the Coastal Plain. These soils formed in unconsolidated deposits of sandy marine and old alluvial sediments. Slopes range from 0 to 15 percent.

Soils of the Sassafras series are fine-loamy, siliceous, mesic Typic Hapludults.

Typical pedon of Sassafras gravelly loam, in an area of Sassafras-Urban land complex, 0 to 8 percent slopes, about 0.3 mile north on Hillen Road from its intersection with Northern Parkway, 500 feet west of Hillen Road, and 20 feet south of a narrow dirt road, in Mount Pleasant Park near the Baltimore County line, in a wooded area:

A1—0 to 2 inches; very dark gray (10YR 3/1) gravelly loam; weak fine granular structure; friable, nonsticky and slightly plastic; many very fine, fine, and medium roots; 15 percent fine rounded quartzite gravel; very strongly acid; abrupt smooth boundary.

BE—2 to 6 inches; yellowish brown (10YR 5/4) gravelly loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; 15 percent fine rounded quartzite gravel; very strongly acid; clear wavy boundary.

Bt1—6 to 27 inches; dark yellowish brown (10YR 4/6) gravelly loam; weak medium subangular blocky structure, friable, slightly sticky and slightly plastic; few distinct clay films on faces of peds; 15 percent fine and medium rounded quartzite gravel; very strongly acid; clear wavy boundary.

Bt2—27 to 34 inches; strong brown (7.5YR 5/8) loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common distinct clay films on faces of peds; 10 percent fine rounded quartzite gravel; very strongly acid; clear wavy boundary.

Bt3—34 to 42 inches; dark yellowish brown (10YR 4/6) loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common prominent clay films on faces of peds; 3 percent fine rounded quartzite gravel; very strongly acid; abrupt wavy boundary.

C—42 to 65 inches; strong brown (7.5YR 5/6) gravelly sandy loam; massive; friable, slightly sticky and slightly plastic; 30 percent fine and medium rounded quartzite gravel; very strongly acid.

The thickness of the solum ranges from 25 to 45 inches. Gravel content ranges from 0 to 30 percent in individual horizons in the solum with a weighted average of 5 to 20 percent. Gravel content in the C horizon ranges as much as 30 percent. The soil is strongly acid to extremely acid in unlimed areas.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 to 4.

The BE horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 or 6. Texture is loam or gravelly loam.

The Bt horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 4 to 8. Texture is gravelly loam, sandy clay loam, or loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 3 to 8. In some pedons the color is variegated. Texture is gravelly sandy loam, sandy loam, or loamy sand.

Sunnyside Series

The Sunnyside series consists of very deep, well drained soils on level uplands, side slopes, and ridges on the Coastal Plain. These soils formed in unconsolidated deposits of very old, dominantly sandy sediment. Slopes range from 0 to 45 percent.

Soils of the Sunnyside series are fine-loamy, siliceous, mesic Typic Hapludults.

Typical pedon of Sunnyside fine sandy loam, in an area of Sunnyside fine sandy loam, 8 to 15 percent slopes, about 250 feet south of Waterview Road across from Waterview Marina and 100 feet north of apartment buildings on Seamon Avenue, in a wooded area:

A—0 to 5 inches; very dark gray (10YR 3/1) fine sandy loam; moderate medium granular structure; very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; very strongly acid; clear smooth boundary.

E—5 to 10 inches; strong brown (7.5YR 5/6) fine sandy loam; moderate medium subangular blocky structure; very friable, nonsticky and nonplastic; common fine and medium roots; very strongly acid; clear smooth boundary.

Bt—10 to 39 inches; red (2.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; gradual smooth boundary.

C1—39 to 52 inches; red (2.5YR 5/8) and light reddish brown (5YR 6/4) loamy fine sand; single grain; loose; extremely acid; gradual smooth boundary.

C2—52 to 65 inches; pink (5YR 7/3 and 5YR 8/3) loamy fine sand; single grain; loose; extremely acid.

The thickness of the solum ranges from 24 to 48 inches. The soil is strongly acid to extremely acid in unlimed areas.

The A horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The E horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. Texture is fine sandy loam, loam, or sandy clay loam.

The Bt horizon has hue of 7.5YR to 2.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is sandy clay loam or loam.

The C horizon has variegated hue of 5YR or 2.5YR, value of 4 to 8, and chroma of 3 to 8. Texture is fine sandy loam, loamy fine sand, or fine sand. In some pedons a 2C horizon of red clay is below a depth of 60 inches.

Woodstown Series

The Woodstown series consists of very deep, moderately well drained soils on uplands and in shallow depressions on the Coastal Plain. These soils formed in sandy and loamy, old alluvial sediments over finer textured marine sediments. Slopes range from 0 to 8 percent.

Soils of the Woodstown series are fine-loamy, mixed, mesic Aquic Hapludults.

Typical pedon of Woodstown sandy loam, in an area of Woodstown-Urban land complex, 0 to 8 percent slopes, about 90 feet southwest of the corner of Hillen Road and Belvedere Avenue, adjoining the Good Samaritan Hospital, in a wooded vacant lot:

A1—0 to 2 inches; dark gray (10YR 4/1) sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 5 percent rounded quartzite gravel; moderately acid; abrupt smooth boundary.

A2—2 to 6 inches; dark grayish brown (2.5Y 4/2) sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 5 percent rounded quartzite gravel; strongly acid; clear smooth boundary.

BE—6 to 22 inches; light olive brown (2.5Y 5/4) sandy loam; few fine faint dark grayish brown and dark yellowish brown (10YR 4/2 and 10YR 4/6) mottles; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; 10 percent rounded quartzite gravel; very strongly acid; gradual smooth boundary.

Bt—22 to 41 inches; dark yellowish brown (10YR 4/6) sandy clay loam; many prominent light gray (2.5Y 7/1) mottles; moderate medium subangular blocky structure; friable, nonsticky and slightly plastic; common very fine, fine, and medium and few coarse roots; 10 percent rounded quartzite gravel; very strongly acid; clear smooth boundary.

C—41 to 53 inches; dark yellowish brown (10YR 4/6) sandy loam with 10 percent light gray (2.5Y 7/2) sandy loam; massive; very friable, nonsticky and nonplastic; few fine roots; 2 percent fine rounded quartzite gravel; very strongly acid; abrupt smooth boundary.

2C—53 to 65 inches; light gray (7.5YR 7/0) clay loam; many prominent red (2.5YR 5/6) mottles; massive; firm, sticky and very plastic; 2 percent rounded quartzite gravel; strongly acid.

The thickness of the solum ranges from 35 to 45 inches. Coarse fragment content ranges from 0 to 20 percent quartzite gravel in the solum and the C horizon. The soil is strongly acid to very strongly acid where unlimed.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 0 to 4.

The BE horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4. Texture is loam or sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. Mottles or variegations with chroma of 2 or less are in the upper 24 inches of the Bt horizon. Texture is sandy clay loam, loam, or sandy loam that is 18 to 27 percent clay.

The C and 2C horizons have variegations of color that has hue ranging from 2.5YR to 2.5Y. The horizon is stratified with textures ranging from sand to clay loam.

Formation of the Soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation.

Factors of Soil Formation

This section was prepared by Maxine J. Levin, soil scientist, Natural Resources Conservation Service, and Dr. Delvin Fanning, Professor of Agronomy, University of Maryland at College Park.

This section discusses the major factors and processes that have affected the formation and morphology of soils in the City of Baltimore. Soils, as used in this discussion, are earthy materials on land surfaces that in places have been modified or even made by humans; soils support or are capable of supporting plants higher in evolution than lichens, such as mosses, trees, shrubs, and grasses.

Soils formed through the interaction of five major factors: climate, plant and animal life, parent material, relief, and time. The relative influence of each factor varies from place to place, and in some places one factor dominates in the formation of a soil and determines most of its properties. Local variation in soils in the City of Baltimore is caused mainly by differences in parent material, relief, time, and the effects of humans.

In the urban environment of the City of Baltimore, the influence of human activity on soils has been great. For example, by using bulldozers and other earthmoving equipment, humans have destroyed, created, or highly modified some soils. Humans have influenced each of the factors of soil formation. Thus, the effects of human activity are mentioned in the discussion of each factor.

Climate

The City of Baltimore has a humid, continental climate marked by seasonal temperature changes. Annual precipitation is about 39 inches, and mean annual air temperature is about 57 degrees F. The distribution of rainfall, which is nearly uniform throughout the year, reaches a maximum in August. During the growing season, which is April through September, rainfall averages about 21 inches.

Some differences in climate exist throughout the city, such as the somewhat cooler temperatures and shorter growing seasons at higher elevations away from downtown areas. Even so, these small differences have not been reflected in soil properties. Also, urban heat in downtown areas may make average soil temperatures somewhat higher in these areas, and higher temperatures may occur around buildings.

The generally humid climate has caused strong weathering and leaching of the natural soils. In most places the soil materials have weathered to a considerable depth because of exposure to climatic forces for a long period of time. The only materials not deeply and strongly weathered are either highly resistant to weathering or have been exposed to weathering for only a short time, for example, the material on some steep slopes.

Most of the bases have been leached, and the soils of the city contain no free carbonates from limestone, except where some of those materials, such as oyster shells, have been added by humans. Almost all the natural soils are acid, and some are strongly acid to extremely acid. Weathering and leaching have left a low natural supply of plant nutrients in most of the natural soils. Some of the younger, highly human-influenced soils may be high in content of certain nutrients; however, the content is commonly variable. Because of leaching of clay from surface horizons and the clay formation, the subsoil of most of the natural, level to rolling upland soils is clay enriched. Alternate wetting and drying and freezing and thawing are responsible for prismatic and blocky structure in a clay-enriched subsoil. In many soils alternate wetting, especially in the presence of organic materials, and drying are also responsible for translocation and segregation of iron.

For more detailed information on climate, see the section "General Nature of the Survey Area".

Plant and Animal Life

All living organisms, including vegetation, bacteria and fungi, and animals, are important to soil formation. Vegetation generally supplies the organic matter that decomposes and gives a dark color to soil surface horizons, and the vegetation supplies organic matter to these horizons. Many trees and other plants take up plant nutrients from the soil and store them in their roots, stems, and leaves. When parts or all of these plants

decompose on or in the soils, the elements are returned to the soil to be used again. Bacteria and fungi decompose vegetation and return nutrients. Also, many organic reactions and processes of bacteria and fungi release materials that affect the soil-forming processes. Earthworms, ants, cicada, and burrowing animals mix soils and affect soil structure, which generally makes the soils more open and porous.

Human activity also affects soil structure and makes soils more porous in places by tillage and management practices. In other instances, however, humans compact soils and make them more dense by foot and vehicle traffic. This compaction has occurred in many soils in the city, leading to low porosity and stagnant soil atmospheres that limit healthy plant growth. Intensive human use and disturbance of some soils have caused the losses of accelerated soil erosion from certain upland soils, often accompanied by increased deposition on flood plains and in depressions. In other instances human cultural practices have slowed the rate of erosion. Humans have also altered many soils chemically through the use of limes and fertilizers to make the soils more favorable for desired plants. In a washing effect similar to liming, concrete pavements slowly dissolve and release chemical compounds into surrounding soils. Deicing salt applied to highways often reaches adjacent soils and causes temporary salinity that is harmful to plants.

In many instances humans have constructed new soils. Sometimes these soils have been made only to support activities on the surface, and little attention has been paid to the physical, chemical, and mineralogical properties of the underlying layers. Much remains to be learned about ways to construct suitable soils. Humans have also introduced plants and animals not normally found in this area; and these plants and animals also affect soils.

Thus, human activities, like those of all organisms, alter and disturb the soil; however, in the City of Baltimore humans have become a dominant force because of the extent and magnitude of human alterations.

Parent Material

Parent material is material in which soils form. It influences the mineral and chemical composition of the soil and to a large extent the rate at which soil formation takes place.

In the City of Baltimore soils formed in four general types of parent material. The first type is residual material derived from the weathering of rocks in place on the Piedmont Plateau. The second type is unconsolidated Coastal Plain sediment consisting of sand, silt, clay, and rock fragments deposited over long periods of geologic time. This sediment has been transported and deposited by water, wind, gravity, or a combination of these forces. Recent alluvial sediment and associated materials dredged by humans from waterways (e.g., to promote navigation) are the third type. These sediments have mostly resulted from erosion of soils on the Piedmont Plateau and Coastal Plain; the sediments were deposited on flood plains in depressions, on low stream terraces, and in formerly submerged areas. The fourth type of material consists of rock fragments, saprolite, sand, silt, clay, and organic and inorganic objects associated with and deposited during human activities.

Residual parent material weathered from rocks in the Piedmont Plateau physiographic province covers roughly all the northwestern third and small parts of the northern and northeastern parts of the City of Baltimore. This residuum was derived from several kinds of metamorphosed Precambrian, Cambrian, and lower Paleozoic crystalline rocks. These rocks, in many places, are intruded by younger igneous rocks, mainly quartz diorite and pegmatite. The metamorphic rocks in the northwest, south to Loudon Park Cemetery, are amphibolite, mafic, and ultramafic rocks with intrusive, igneous rocks of gneiss and pegmatite. Some of the soils that formed in material weathered in place from these rocks are Jackland, Legore, and Montalto soils. The acid, crystalline metamorphic rocks in the north and northeast include schist and gneiss, which commonly contain considerable mica. Some of the soils that formed in material weathered in place from these rocks are Brandywine, Chester, and Manor soils.

The Coastal Plain sediments cover roughly two-thirds of the City of Baltimore. The Coastal Plain in the city consists of stratified, sandy, silty, clayey, and loamy sediments that also contain lignitized or other carbonaceous materials in places. These sediments range in geologic age from the Cretaceous to the Quaternary. Most of the soils formed in material weathered from these formations retain many of the particle-size and mineralogy characteristics typical of the sediment.

The oldest Coastal Plain formations were deposited during the Cretaceous. They are composed of gray and yellow sand; red, brown, and gray clay containing iron nodules; and variegated red and yellow sand, clay, and fine gravel interbedded with layers of clay. In some areas these materials are capped by remnants of Pleistocene sand, gravel, silt, clay, or sandy clay. The Christiana and Sunnyside soils and the subsoil of the Keyport soils formed in the Cretaceous materials.

Paleocene, Miocene, and Pliocene deposits outcrop at various locations; however, these outcrops are of small extent. Pleistocene deposits are exposed at lower elevations over a part of the central and southeastern parts of the city. These deposits consist of coarse and fine sand, silt, clay, and gravel. They are the parent material of

the Galestown, Woodstown, Mattapex, and Sassafras soils. Gravelly river outwash deposits of Cretaceous, Pliocene, and early Pleistocene age are the parent material of Joppa soils. The Beltsville, Matapeake, and Mattapex soils formed in a silty mantle, probably wind-deposited, that occurs over sediments of both Pleistocene and lower Cretaceous age.

The recent alluvial sediment consists of material that has been eroded from the Piedmont Plateau and the Coastal Plain and deposited along streams. Micaceous sediment derived from the Piedmont Plateau and deposited on flood plains is the parent material of Fluvents. However, most soils mapped as Fluvents formed in material recently eroded from the Piedmont Plateau and Coastal Plain provinces. Silty, sandy, and clayey dredged materials were deposited in shallow water, on tidal flats, and in former marshes in estuaries that bordered the city to the south, southwest, and southeast. Many of these areas are low enough in elevation to be flooded during storms, such as Hurricanes Agnes and Eloise. These deposits are probably mixtures of materials eroded from the Appalachian, Piedmont Plateau, and Coastal Plain provinces. Most soils formed in these materials are relatively homogeneous and have color patterns that reflect drainage class differences. They also have a prismatic and blocky soil structure. Some of the soils that formed in dredged materials are like natural alluvial soils. However, in many areas the dredged materials contain sulfides; when exposed to aerobic conditions, they formed extremely acid sulfate soils called Sulfaquepts. Where dredged materials that were modern sediments have not been reworked with bulldozers, these soils tend to be low density and soft and have low physical-bearing capacity. In other areas these dredged materials have been reworked and packed with heavy equipment. In these areas the soils are physically much like those in other fill materials described later.

Large areas of the City of Baltimore are made up of soils that formed in parent material that has been deposited or disturbed by humans. This material consists mainly of Piedmont Plateau material, Coastal Plain sediment, and recent alluvial sediments commonly mixed with varying proportions of organic and inorganic objects associated with human culture. These objects, called artifacts, include bricks, glass, slag, coal, ash, concrete, asphalt, nails, lumber, paper, plastics, garbage, and metal alloys. The manmade, highly disturbed deposits make up the parent material of soils that formed on cut (scalped) land surfaces and on fill materials.

The soils that formed on cuts and similar excavation surfaces consist of former subsoils and underlying materials exposed at the surface. These areas have commonly been mapped as Udorthents. In these areas cuts have been made under the direction of engineers, and the material has been removed and used to fill adjacent areas. Also in these areas the associated fill is generally made up of mixed materials from the site. Thus, the soils have many properties of the prior soil and underlying geologic material. Many of these cut and fill materials were estimated to be homogeneous enough in particle-size class to be mapped as subgroup units phased with family particle-class modifiers, for example, Udorthents, loamy. Where the parent material was relatively heterogeneous, the cut and fill materials were mapped as undifferentiated Udorthents, smoothed, 0 to 35 percent slopes. Most of the fill in the map units where the soils have been cut and filled contains relatively few artifacts.

Most of the remaining soils in fill deposits are not associated with cut surfaces, and contain varying amounts of artifacts. These fill deposits in the City of Baltimore can be further subdivided into two groups. One group consists of soils that formed in deposits composed mainly of mineral soil, geologic materials (from Piedmont Plateau residuum, Coastal Plain sediment, and recent alluvium), and inorganic artifacts. The artifacts generally include bricks, cinders, glass, concrete, wood, and metal. The soils in this group have been described in Udorthents, smoothed, 0 to 35 percent slopes.

These fill materials, over short distances, exhibit marked heterogeneity as to texture, thickness, and arrangement of strata, content and type of artifacts, and volume and type of coarse fragments. Bulk densities tend to be high, but variable. Although these deposits have some organic matter in places at the lower depths, the total amount is considered to be low compared to Udorthents, sanitary landfill, 0 to 15 percent slopes. The physical bearing capacity of these soils tends to be better than Udorthents, sanitary landfill, 0 to 15 percent slopes, or other soils that have a high organic matter content, such as Sulfaquepts, dredged.

The second group of fill soils is Udorthents, sanitary landfill, 0 to 15 percent slopes. In these soils organic material, such as paper and garbage, and mixed inorganic waste are commonly covered with 3 to 4 feet of soil material. This soil material resembles the parent material of other Udorthents and in places has been amended with sewage sludge.

The second group of fill soils is distinguished from the first by the large amount of organic matter at lower depths without readily available oxygen. Under these anaerobic conditions, such hazardous gases as methane build up in the soils, particularly in the substratum. These soils are severely limited for most kinds of construction because of the probability of differential settling and the possibility of explosive gases. Also, the gases produced are harmful or toxic to many kinds of plants. Thus, the soils formed in these materials were separated into distinctive classes.

Subsidence caused by decomposition and collapse of organic materials is another limitation of these soils for construction.

Relief

The City of Baltimore straddles the Fall Line, which is the boundary between the unconsolidated sediment of the Atlantic Coastal Plain in the southeast and the rocks on the Piedmont Plateau in the northwest. The Piedmont Plateau consists of gently rolling and level uplands strongly dissected by streams that have steep valley walls. The Coastal Plain is gently rolling to moderately sloping at the margin where it joins the Piedmont Plateau. Near the lower, central part of the city, which makes up the lower downtown business and harbor area, the topography is very gently sloping to level.

In soil formation, relief controls surface drainage and affects the percolation of water through the soil. Relief often affects the depth of the soil, the plant and animal life, and some soil-forming processes. For example, soils in landscape depressions are usually wet, such as the poorly drained Baile soils. Montalto and Legore soils are on higher, convex surfaces. They are better drained and have well developed, pedogenic horizons. Soils on steeper slopes, such as most Manor soils, are well drained or somewhat excessively drained. They generally have weakly expressed horizons because of erosion.

Natural differences in elevation and shape of the land surface account for many of the differences among soils that formed in the same kind of parent material. The differences in topography cause free water to leave the well drained soils and accumulate in the poorly drained soils.

In the City of Baltimore, humans have become a complicating factor in recognizing relief as a soil-forming factor. Most soils at the surface of manmade land are too young to show differences in color and other properties normally associated with topographic differences. For this reason, different drainage classes of soils have not been recognized for the soils formed in human-deposited materials. Humans have shaped the land and made new landforms, often changing drainage relationships and thereby changing some of the chemical and physical processes of the soils. Udorthents are map units that display relief that has been created or strongly altered by humans.

Time

The length of the time that soil parent material has been in place and exposed to the active forces of climate and plant and animal life strongly influences the nature of the soil.

Very young soils, such as those formed in recent alluvium or in recent, human-deposited fill material, are essentially unaltered parent material. Most of these soils are classified as Entisols, which are recently formed soils. The C horizon in these soils extends virtually to the surface and is subdivided only on the basis of depositional stratification of different materials.

The age of some soils in human-deposited materials is known from historical records or from artifacts in the soils. Udorthents mapped at these sites showed little evidence of change from the parent material except some had a developed soil structure. However, chemical pedogenic changes occur rapidly in those materials containing sulfide minerals, for example, materials from lignitic strata or materials from dredging. These changes can lead to the rapid formation of extremely acid, sulfuric horizons.

Natural soils in the Piedmont Plateau and Coastal Plain uplands of the City of Baltimore generally are much older and have a soil profile that reflects their age. On the more nearly level land surfaces, these soils have a B horizon that has been enriched with clay by soil-forming processes. Most of these soils are classified as Ultisols (from ultimate).

The steeper sloping, natural soils on uplands, such as Brandywine and Manor soils, are less developed, and have only structure and color of a B horizon but little clay enrichment. These soils are classified as Inceptisols.

Morphology of the Soils

The effect of soil-forming factors is the different layers, or horizons, in soil profiles. The soil profile extends from the surface down to materials that are little altered by the soil-forming processes; in some soils a profile includes deeper, unaltered layers.

Most soils contain three major horizons, the A, B, and C horizons. Some soils, particularly those in forests, also have an O (organic) horizon at the surface. This horizon is an accumulation of organic material, such as twigs and leaves, or of humified organic material that is little admixed with mineral material. The major horizons can be subdivided by the use of numbers and letters to indicate differences within the horizon. The Bt horizon, for example, represents the most developed part of a B horizon that has an accumulation of clay from overlying horizons. Sunnyside soils, for example, have a Bt horizon.

The A horizon is a mineral surface layer. It is darkened by humified organic matter. An Ap horizon is a plow layer, commonly also darkened with organic matter. The E horizon is the layer of maximum leaching or eluviation of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, an E horizon has formed. Where formed, the E horizon is normally the lightest color horizon in the profile.

The B horizon normally underlies the A horizon or A and E horizons and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, oxides, or other compounds leached from the surface layer.

In some soils, such as Manor soils, the B horizon was formed mainly by alteration of the original material rather than by illuviation. The alteration can be caused by the weathering of the parent material, the releasing of iron to give rusty colors, and the development of soil structure in place of the original rock or sediment structure. The B horizon commonly has blocky or prismatic structure; it generally is firmer and is lighter in color than the A horizon, but darker colored than the C or E horizon.

The C horizon is below the A or B horizon or both. It consists of materials that are little altered by the soil-forming processes, but that may have been modified by weathering.

In young soils, such as those that formed in recent alluvium or in human-deposited fill materials, the C horizon may reach to or near the soil surface. Also, these soils do not have a B horizon or in places an A horizon.

Processes of Soil Formation

Accumulation of organic matter, leaching of soluble salts, reduction or oxidation of iron, formation of soil structure, formation and movement of clay minerals, and mixing by animals and plants: these basic chemical and physical processes form soil. These processes, combined with the influences of the factors of soil formation, create differences among soils and differences between soils and the original parent material.

Plant nutrients, or bases, are added to soils by organic matter, by seepage, by depositions of sediments from erosion, floodwater, or air-borne additions, and by applications of lime and fertilizers, including such organic amendments as sewage sludge or sewage sludge compost. The nutrients move in a cycle from soil to plants and back to soil again in the form of litter and organic matter. The addition and mixing of organic matter on the surface of a soil darkens the surface and helps to form the A horizon.

The surface horizon, normally present in undisturbed soils, is often destroyed by human activity, such as cultivation, accelerated erosion, and earthmoving in urban development. The dark, organic surface is lost, and generally is replaced very slowly. However, cultivating and thus mixing of surface soil can rapidly form an Ap horizon. Floodwater periodically deposits sediment and adds a new surface layer to Fluvents. Lime and fertilizer added to landscaped or cultivated soils throughout the city replace and sometimes exceed the amount normally removed by plant growth or harvesting. These additions create concern about excess leaching of nutrients into surface waters, leading to eutrophication of streams.

For soils to have distinct subsoil horizons, lime and other minerals in the soil must break down and be moved by soil water to deeper parts of the soil profile or into the ground water. The soil color changes as minerals are altered chemically and clay is moved by water in the soil profile. Free iron oxides produced by altered minerals in well drained soils, such as Chester, Legore, Sassafras, Sunnyside, and Montalto soils, make fairly bright yellowish brown and reddish brown colors in the subsoil. The seasonal high water table in Baile, Elkton, and Leonardtown soils reduces iron in a process called gleying. Gleying produces predominantly gray colors in the soil, particularly the subsoil. Moderately well drained soils, such as Jackland, Beltsville, Keyport, Mattapex, and Woodstown soils, have mottles of yellowish brown and reddish brown, which indicate a reduction, transfer, and segregation of iron oxides.

A hard, firm layer called a fragipan has formed in the subsoil of Jackland, Beltsville, and Leonardtown soils. These soils are moderately well drained or somewhat poorly drained. The fragipan is firm and brittle when moist and very hard when dry. It impedes water drainage and perches the water table in these soils. The soil particles are tightly packed; thus, bulk density is high and pore space is low. The formation of these horizons is not fully understood, but studies show that shrinking and swelling takes place in alternate wet and dry cycles. Shrinking and swelling contribute to dense packing of soil particles and the polygonal pattern of cracking in the fragipan. Clay, silica, and oxides of aluminum are the most likely cementing agents to cause brittleness and hardness.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial cone. The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be

supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coppice dune. A small dune of fine grained soil material stabilized around shrubs or small trees.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight,

after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented, restricts roots, and perches water. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Ironstone. A continuous layer of indurated material in which iron is an important cement and organic matter is either absent or present only in traces.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and

with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (*in tables*). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated,

weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the

horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any subsurface soil horizon (E, BE, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to

tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Urban land. Areas where more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-90 at Baltimore, Maryland)

Month	Temperature						Precipitation				
				2 years in 10 will have--		Average		2 years in 10 will have--		Average	
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	number of growing degree days*	Average	Less than--	More than--	number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	41.7	28.0	34.9	67	7	558	3.14	1.61	4.48	6	5.9
February----	44.7	29.9	37.3	73	11	76	3.18	1.67	4.51	5	6.3
March-------	54.9	38.2	46.6	84	18	241	3.63	2.04	5.05	6	4.1
April-------	65.5	47.6	56.5	91	30	497	3.24	1.75	5.54	6	.0
May---------	75.6	57.8	66.7	95	42	829	4.05	2.05	5.80	7	.0
June--------	84.6	67.3	76.0	99	52	1,079	3.32	1.90	4.57	5	.0
July--------	88.6	72.0	80.3	101	60	1,250	3.67	1.94	5.19	5	.0
August------	86.8	70.5	78.7	100	57	1,198	4.28	1.75	6.41	6	.0
September---	79.9	63.3	71.6	97	46	948	3.50	1.15	5.43	4	.0
October-----	68.4	51.1	59.9	88	34	618	2.98	1.33	4.39	4	.0
November----	57.2	42.1	49.6	80	25	303	3.60	1.75	5.21	5	.5
December----	46.1	32.4	39.3	72	13	101	3.75	1.65	5.54	5	3.7
Yearly:											
Average---	66.2	50.0	58.1	---	---	---	---	---	---	---	---
Extreme---	105	-2	---	102	6	---	---	---	---	---	---
Total-----	---	---	---	---	---	7,197	42.34	33.70	49.82	64	20.5

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-90 at Baltimore, Maryland)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 24	Apr. 1	Apr. 12
2 years in 10 later than--	Mar. 18	Mar. 27	Apr. 6
5 years in 10 later than--	Mar. 6	Mar. 17	Mar. 27
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 21	Nov. 16	Oct. 30
2 years in 10 earlier than--	Nov. 27	Nov. 21	Nov. 5
5 years in 10 earlier than--	Dec. 9	Dec. 1	Nov. 14

TABLE 3.--GROWING SEASON

(Recorded in the period 1961-90 at Baltimore, Maryland)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	244	229	209
8 years in 10	251	236	217
5 years in 10	264	250	231
2 years in 10	277	263	246
1 year in 10	284	270	253

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1UB	Baile-Urban land complex, 0 to 8 percent slopes	76	0.1
2B	Beltsville-Keyport complex, 0 to 8 percent slopes	165	0.3
2UB	Beltsville-Urban land complex, 0 to 8 percent slopes	977	1.7
2UC	Beltsville-Urban land complex, 8 to 15 percent slopes	74	0.1
3UB	Urban land-Beltsville-Keyport complex, 0 to 8 percent slopes	192	0.3
4UB	Urban land-Beltsville complex, 0 to 8 percent slopes	290	0.5
5E	Brandywine loam, 15 to 60 percent slopes	129	0.2
6B	Chester loam, 0 to 8 percent slopes	114	0.2
6UB	Chester-Urban land complex, 0 to 8 percent slopes	675	1.1
7UB	Christiana-Urban land complex, 0 to 8 percent slopes	181	0.3
7UC	Christiana-Urban land complex, 8 to 15 percent slopes	93	0.2
8UB	Urban land-Christiana complex, 0 to 8 percent slopes	44	0.1
9UB	Elkton-Urban land complex, 0 to 5 percent slopes	85	0.1
10	Fluvents, frequently flooded	830	1.4
11B	Galestown loamy sand, 0 to 8 percent slopes	215	0.4
11UB	Galestown-Urban land complex, 0 to 8 percent slopes	89	0.2
12A	Jackland silt loam, 0 to 3 percent slopes	32	0.1
12B	Jackland silt loam, 3 to 8 percent slopes	213	0.4
12UB	Jackland-Urban land complex, 0 to 8 percent slopes	1,815	3.1
13B	Joppa gravelly sandy loam, 0 to 8 percent slopes	124	0.2
13C	Joppa gravelly sandy loam, 8 to 15 percent slopes	190	0.3
13E	Joppa gravelly sandy loam, 15 to 60 percent slopes	80	0.1
13UB	Joppa-Urban land complex, 0 to 8 percent slopes	1,310	2.2
13UC	Joppa-Urban land complex, 8 to 15 percent slopes	1,124	1.9
14UB	Urban land-Joppa complex, 0 to 8 percent slopes	559	0.9
15B	Keyport loam, 0 to 8 percent slopes	184	0.3
15UB	Keyport-Urban land complex, 0 to 8 percent slopes	849	1.4
16UB	Urban land-Keyport complex, 0 to 8 percent slopes	164	0.3
17B	Legore loam, 0 to 8 percent slopes	421	0.7
17C	Legore loam, 8 to 15 percent slopes	377	0.6
17E	Legore loam, 15 to 45 percent slopes	556	0.9
18B	Legore loam, 0 to 8 percent slopes, stony	200	0.3
18C	Legore loam, 8 to 15 percent slopes, stony	219	0.4
18E	Legore loam, 15 to 50 percent slopes, stony	454	0.8
18UB	Legore-Urban land complex, 0 to 8 percent slopes	3,040	5.2
18UC	Legore-Urban land complex, 8 to 15 percent slopes	2,314	3.9
18UE	Legore-Urban land complex, 15 to 45 percent slopes	60	0.1
19UB	Urban land-Legore complex, 0 to 8 percent slopes	232	0.4
19UC	Urban land-Legore complex, 8 to 15 percent slopes	147	0.2
20B	Leonardtown silt loam, 0 to 8 percent slopes	36	0.1
20UB	Leonardtown-Urban land complex, 0 to 8 percent slopes	345	0.6
21C	Manor loam, 8 to 15 percent slopes	132	0.2
21E	Manor loam, 15 to 50 percent slopes	342	0.6
22UB	Manor-Urban land complex, 0 to 8 percent slopes	193	0.3
22UC	Manor-Urban land complex, 8 to 15 percent	487	0.8
23UB	Urban land-Manor complex, 0 to 8 percent slopes	71	0.1
24UB	Matapeake-Urban land complex, 0 to 8 percent slopes	102	0.2
25B	Mattapex silt loam, 0 to 8 percent slopes	64	0.1
25UB	Mattapex-Urban land complex, 0 to 8 percent slopes	878	1.5
26B	Montalto silt loam, 0 to 8 percent slopes	227	0.4
26C	Montalto silt loam, 8 to 15 percent slopes, very stony	59	0.1
26UB	Montalto-Urban land complex, 0 to 8 percent slopes	1,269	2.2
26UC	Montalto-Urban land complex, 8 to 15 percent slopes	119	0.2
27UB	Urban land-Montalto complex, 0 to 8 percent slopes	67	0.1
28B	Relay silt loam, 0 to 8 percent slopes, very stony	72	0.1
28C	Relay silt loam, 8 to 15 percent slopes, very stony	42	0.1
28E	Relay silt loam, 15 to 60 percent slopes, very stony	294	0.5
28UB	Relay-Urban land complex, 0 to 8 percent slopes	72	0.1
28UC	Relay-Urban land complex, 8 to 15 percent slopes	55	0.1
28UE	Relay-Urban land complex, 15 to 45 percent slopes	60	0.1
29B	Sassafras, gravelly loam, 0 to 8 percent slopes	175	0.3
29C	Sassafras, gravelly loam, 8 to 15 percent slopes	51	0.1
29UB	Sassafras-Urban land complex, 0 to 8 percent slopes	1,015	1.7

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
29UC	Sassafras-Urban land complex, 8 to 15 percent slopes	517	0.9
30B	Sassafras-Joppa complex, 0 to 8 percent slopes	193	0.3
31UB	Urban land-Sassafras complex, 0 to 8 percent slopes	1,157	2.0
32	Sulfaquepts, dredge	151	0.3
33B	Sunnyside-Christiana complex, 0 to 8 percent slopes	242	0.4
33C	Sunnyside-Christiana complex, 8 to 15 percent slopes	50	0.1
33UB	Urban land-Sunnyside complex, 0 to 8 percent slopes	686	1.2
33UC	Sunnyside-Urban land complex, 8 to 15 percent slopes	373	0.6
34UB	Urban land-Sunnyside-Christiana complex, 0 to 8 percent slopes	1,173	2.0
34UC	Urban land-Sunnyside-Christiana complex, 8 to 15 percent slopes	879	1.5
35B	Sunnyside fine sandy loam, 0 to 8 percent slopes	213	0.4
35C	Sunnyside fine sandy loam, 8 to 15 percent slopes	132	0.2
36UB	Sunnyside-Urban land complex, 0 to 8 percent slopes	777	1.3
37	Sulfaquepts, frequently flooded	65	0.1
38C	Udorthents, clayey, very deep, 0 to 15 percent slopes	130	0.2
39B	Udorthents, loamy, deep, 0 to 8 percent slopes	356	0.6
39C	Udorthents, sanitary landfill, 0 to 15 precent slopes	345	0.6
39E	Udorthents, loamy, deep, 15 to 60 percent slopes	99	0.2
40B	Udorthents, loamy, very deep, 0 to 8 percent slopes	334	0.6
40C	Udorthents, loamy, very deep, 8 to 15 percent slopes	308	0.5
40E	Udorthents, loamy, very deep, 15 to 60 percent slopes	547	0.9
41E	Udorthents, gravelly, very deep, 0 to 60 percent slopes	53	0.1
42	Udorthents-Fluvents complex, occasionally flooded	142	0.2
42E	Udorthents, smoothed, 0 to 35 percent slopes	3,640	6.2
43U	Urban land-Udorthents complex, occasionally flooded	917	1.6
44UC	Urban land, 0 to 15 precent slopes	12,422	21.1
45UB	Woodstown-Urban land complex, 0 to 8 percent slopes	613	1.0
46UB	Urban land-Woodstown complex, 0 to 8 percent slopes	46	0.1
W	Water	7,220	12.3
	Total	58,900	100.0

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
1UB**:									
Baile----------	4W	Slight	Moderate	Moderate	Slight	Pin oak----------	85+	4	Eastern white pine, Norway spruce, white spruce.
						American holly------	---	---	
						Red maple----------	---	---	
Urban land.									
2B**:									
Beltsville-----	4W	Slight	Moderate	Moderate	Moderate	Black oak----------	70	4	Virginia pine, loblolly pine.
						Virginia pine-------	70	8	
						Loblolly pine-------	70	6	
						White oak----------	---	---	
						Pin oak----------	---	---	
						Sweetgum----------	---	---	
						Red maple----------	---	---	
Keyport--------	6A	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	6	Yellow-poplar, northern red oak, loblolly pine.
						Northern red oak----	80	4	
						American beech------	80	4	
						Loblolly pine-------	80	8	
2UB**:									
Beltsville-----	4W	Slight	Moderate	Moderate	Moderate	Black oak----------	70	4	Virginia pine, loblolly pine.
						Virginia pine-------	70	8	
						Loblolly pine-------	70	6	
						White oak----------	---	---	
						Pin oak----------	---	---	
						Sweetgum----------	---	---	
						Red maple----------	---	---	
Urban land.									
2UC**:									
Beltsville-----	4W	Moderate	Moderate	Moderate	Moderate	Black oak----------	70	4	Virginia pine, loblolly pine.
						Virginia pine-------	70	8	
						Loblolly pine-------	70	6	
						White oak----------	---	---	
						Pin oak----------	---	---	
						Sweetgum----------	---	---	
						Red maple----------	---	---	
Urban land.									
3UB**:									
Urban land.									

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
3UB**:									
Beltsville-----	4W	Slight	Moderate	Moderate	Moderate	Black oak----------	70	4	Virginia pine, loblolly pine.
						Virginia pine-------	70	8	
						Loblolly pine-------	70	6	
						White oak----------	---	---	
						Pin oak------------	---	---	
						Sweetgum-----------	---	---	
						Red maple----------	---	---	
Keyport--------	6A	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	6	Yellow-poplar, northern red oak, loblolly pine.
						Northern red oak----	80	4	
						American beech------	80	4	
						Loblolly pine-------	80	8	
4UB**:									
Urban land.									
Beltsville-----	4W	Slight	Moderate	Moderate	Moderate	Black oak----------	70	4	Virginia pine, loblolly pine.
						Virginia pine-------	70	8	
						Loblolly pine-------	70	6	
						White oak----------	---	---	
						Pin oak------------	---	---	
						Sweetgum-----------	---	---	
						Red maple----------	---	---	
5E-------------- Brandywine	4R	Severe	Severe	Moderate	Slight	Black oak----------	70	4	Eastern white pine, European larch, shortleaf pine.
						Yellow-poplar-------	75	4	
						Virginia pine-------	70	8	
						Shortleaf pine------	70	8	
6B-------------- Chester	4A	Slight	Slight	Slight	Slight	Southern red oak----	80	4	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar-------	83	5	
						Virginia pine-------	80	8	
6UB**:									
Chester--------	4A	Slight	Slight	Slight	Slight	Southern red oak----	80	4	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar-------	83	5	
						Virginia pine-------	80	8	
Urban land.									
7UB**:									
Christiana-----	4C	Slight	Moderate	Slight	Slight	White oak----------	70	4	Loblolly pine, Virginia pine.
						Virginia pine-------	70	8	
						Sweetgum-----------	75	5	
Urban land.									
7UC**:									
Christiana-----	4C	Moderate	Moderate	Slight	Slight	White oak----------	70	4	Loblolly pine, Virginia pine.
						Virginia pine-------	70	8	
						Sweetgum-----------	75	5	
Urban land.									

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
8UB**:									
Urban land.									
Christiana-----	4C	Slight	Moderate	Slight	Slight	White oak----------	70	4	Loblolly pine,
						Virginia pine-------	70	8	Virginia pine.
						Sweetgum-----------	75	5	
9UB**:									
Elkton---------	8W	Slight	Severe	Slight	Slight	Loblolly pine-------	78	8	Loblolly pine.
						Sweetgum-----------	80	6	
						Blackgum-----------	---	---	
						Red maple----------	---	---	
						Willow oak---------	---	---	
						Southern red oak----	---	---	
Urban land.									
11B----------	4S	Slight	Moderate	Moderate	Slight	Black oak----------	70	4	Loblolly pine,
Galestown						Loblolly pine-------	80	8	shortleaf
						Virginia pine-------	70	8	pine, Virginia
						Shortleaf pine------	70	8	pine.
11UB**:									
Galestown------	4S	Slight	Moderate	Moderate	Slight	Black oak----------	70	4	Loblolly pine,
						Loblolly pine-------	80	8	shortleaf
						Virginia pine-------	70	8	pine, Virginia
						Shortleaf pine------	70	8	pine.
Urban land.									
12A, 12B--------	3C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white
Jackland						Loblolly pine-------	70	6	pine.
						Yellow-poplar-------	74	4	
						Virginia pine-------	60	6	
12UB**:									
Jackland-------	3C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white
						Loblolly pine-------	70	6	pine.
						Yellow-poplar-------	74	4	
						Virginia pine-------	60	6	
Urban land.									
13B, 13C--------	4F	Slight	Slight	Moderate	Slight	Black oak----------	70	4	Loblolly pine,
Joppa						Virginia pine-------	70	8	Virginia pine.
						Loblolly pine-------	80	8	
13E----------	4R	Moderate	Severe	Moderate	Slight	Black oak----------	70	4	Loblolly pine,
Joppa						Virginia pine-------	70	8	Virginia pine.
						Loblolly pine-------	80	8	
13UB**, 13UC**:									
Joppa----------	4F	Slight	Slight	Moderate	Slight	Black oak----------	70	4	Loblolly pine,
						Virginia pine-------	70	8	Virginia pine.
						Loblolly pine-------	80	8	
Urban land.									

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
14UB**: Urban land.									
Joppa	4F	Slight	Slight	Moderate	Slight	Black oak	70	4	Loblolly pine, Virginia pine.
						Virginia pine	70	8	
						Loblolly pine	80	8	
15B--Keyport	6A	Slight	Slight	Slight	Slight	Yellow-poplar	90	6	Yellow-poplar, northern red oak, loblolly pine.
						Northern red oak	80	4	
						American beech	80	4	
						Loblolly pine	80	8	
15UB**: Keyport	6A	Slight	Slight	Slight	Slight	Yellow-poplar	90	6	Yellow-poplar, northern red oak, loblolly pine.
						Northern red oak	80	4	
						American beech	80	4	
						Loblolly pine	80	8	
Urban land.									
16UB**: Urban land.									
Keyport	6A	Slight	Slight	Slight	Slight	Yellow-poplar	90	6	Yellow-poplar, northern red oak, loblolly pine.
						Northern red oak	80	4	
						American beech	80	4	
						Loblolly pine	80	8	
17B, 17C--Legore	4A	Slight	Slight	Slight	Slight	Black oak	75	4	Yellow-poplar, Virginia pine, loblolly pine, eastern white pine.
						Yellow-poplar	85	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
17E--Legore	4R	Moderate	Moderate	Slight	Slight	Black oak	75	4	Yellow-poplar, Virginia pine, loblolly pine, eastern white pine.
						Yellow-poplar	85	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
18B, 18C--Legore	4A	Slight	Slight	Slight	Slight	Black oak	75	4	Yellow-poplar, Virginia pine, loblolly pine, eastern white pine.
						Yellow-poplar	85	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
18E--Legore	4R	Moderate	Moderate	Slight	Slight	Black oak	75	4	Yellow-poplar, Virginia pine, loblolly pine, eastern white pine.
						Yellow-poplar	85	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
18UB**, 18UC**:									
Legore	4A	Slight	Slight	Slight	Slight	Black oak	75	4	Yellow-poplar, Virginia pine, loblolly pine, eastern white pine.
						Yellow-poplar	85	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
Urban land.									
18UE**:									
Legore	4R	Moderate	Moderate	Slight	Slight	Black oak	75	4	Yellow-poplar, Virginia pine, loblolly pine, eastern white pine.
						Yellow-poplar	85	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
Urban land.									
19UB**, 19UC**:									
Urban land.									
Legore	4A	Slight	Slight	Slight	Slight	Black oak	75	4	Yellow-poplar, Virginia pine, loblolly pine, eastern white pine.
						Yellow-poplar	85	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
20B	8W	Slight	Severe	Severe	Moderate	Loblolly pine	80	8	Loblolly pine, eastern white pine.
Leonardtown						Sweetgum	80	6	
20UB**:									
Leonardtown	8W	Slight	Severe	Severe	Moderate	Loblolly pine	80	8	Loblolly pine, eastern white pine.
						Sweetgum	80	6	
Urban land.									
21C	4R	Moderate	Slight	Moderate	Slight	Black oak	80	4	Yellow-poplar, eastern white pine, Virginia pine, shortleaf pine.
Manor						Yellow-poplar	90	6	
						Virginia pine	80	8	
						Shortleaf pine	80	9	
						Chestnut oak	---	---	
						Southern red oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Blackgum	---	---	
21E	4R	Severe	Moderate	Moderate	Slight	Black oak	80	4	Yellow-poplar, eastern white pine, Virginia pine, shortleaf pine.
Manor						Yellow-poplar	90	6	
						Virginia pine	80	8	
						Shortleaf pine	80	9	
						Chestnut oak	---	---	
						Southern red oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Blackgum	---	---	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
22UB**:									
Manor----------	4A	Slight	Slight	Moderate	Slight	Black oak----------	80	4	Yellow-poplar, eastern white pine, Virginia pine, shortleaf pine.
						Yellow-poplar-------	90	6	
						Virginia pine-------	80	8	
						Shortleaf pine------	80	9	
						Chestnut oak--------	---	---	
						Southern red oak----	---	---	
						White oak----------	---	---	
						Hickory------------	---	---	
						Blackgum-----------	---	---	
Urban land.									
22UC**:									
Manor----------	4R	Moderate	Slight	Moderate	Slight	Black oak----------	80	4	Yellow-poplar, eastern white pine, Virginia pine, shortleaf pine.
						Yellow-poplar-------	90	6	
						Virginia pine-------	80	8	
						Shortleaf pine------	80	9	
						Chestnut oak--------	---	---	
						Southern red oak----	---	---	
						White oak----------	---	---	
						Hickory------------	---	---	
						Blackgum-----------	---	---	
Urban land.									
23UB**:									
Urban land.									
Manor----------	4A	Slight	Slight	Moderate	Slight	Black oak----------	80	4	Yellow-poplar, eastern white pine, Virginia pine, shortleaf pine.
						Yellow-poplar-------	90	6	
						Virginia pine-------	80	8	
						Shortleaf pine------	80	9	
						Chestnut oak--------	---	---	
						Southern red oak----	---	---	
						White oak----------	---	---	
						Hickory------------	---	---	
						Blackgum-----------	---	---	
24UB**:									
Matapeake------	4A	Slight	Slight	Slight	Slight	White oak----------	75	4	Loblolly pine, yellow-poplar, eastern white pine, sweetgum.
						Virginia pine-------	75	8	
						Yellow-poplar-------	90	6	
						Loblolly pine-------	80	8	
Urban land.									
25B----------	4A	Slight	Slight	Moderate	Slight	White oak----------	70	4	Loblolly pine, eastern white pine, yellow-poplar.
Mattapex						Northern red oak----	70	4	
						Loblolly pine-------	81	8	
						Sweetgum-----------	80	6	
						Virginia pine-------	70	8	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
25UB**:									
Mattapex	4A	Slight	Slight	Moderate	Slight	White oak	70	4	Loblolly pine, eastern white pine, yellow-poplar.
						Northern red oak	70	4	
						Loblolly pine	81	8	
						Sweetgum	80	6	
						Virginia pine	70	8	
Urban land.									
26B, 26C Montalto	4C	Slight	Moderate	Slight	Slight	Black oak	76	4	Eastern white pine, yellow-poplar, black walnut, loblolly pine.
						Yellow-poplar	90	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
						Eastern white pine	90	12	
26UB**, 26UC**:									
Montalto	4C	Slight	Moderate	Slight	Slight	Black oak	76	4	Eastern white pine, yellow-poplar, black walnut, loblolly pine.
						Yellow-poplar	90	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
						Eastern white pine	90	12	
Urban land.									
27UB**:									
Urban land.									
Montalto	4C	Slight	Moderate	Slight	Slight	Black oak	76	4	Eastern white pine, yellow-poplar, black walnut, loblolly pine.
						Yellow-poplar	90	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
						Eastern white pine	90	12	
28B, 28C Relay	4A	Slight	Moderate	Slight	Slight	Black oak	76	4	Eastern white pine, yellow-poplar, black walnut, loblolly pine.
						Yellow-poplar	90	6	
						Virginia pine	75	8	
						Shortleaf pine	75	8	
						Eastern white pine	90	12	
28UB**, 28UC**:									
Relay	4A	Slight	Slight	Slight	Slight	Black oak	80	4	Eastern white pine, black walnut, yellow-poplar.
						Virginia pine	80	8	
						Yellow-poplar	90	6	
Urban land.									
28UE**:									
Relay	4R	Moderate	Moderate	Slight	Slight	Black oak	80	4	Eastern white pine, black walnut, yellow-poplar.
						Virginia pine	80	8	
						Yellow-poplar	90	6	
Urban land.									

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
29B, 29C-------- Sassafras	4A	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar------- Loblolly pine------- Virginia pine-------	70 80 85 70	4 5 8 8	Loblolly pine, eastern white pine, yellow-poplar.
29UB**, 29UC**: Sassafras------	4A	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar------- Loblolly pine------- Virginia pine-------	70 80 85 70	4 5 8 8	Loblolly pine, eastern white pine, yellow-poplar.
Urban land.									
30B**: Sassafras------	4A	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar------- Loblolly pine------- Virginia pine-------	70 80 85 70	4 5 8 8	Loblolly pine, eastern white pine, yellow-poplar.
Joppa----------	4F	Slight	Slight	Moderate	Slight	Black oak---------- Virginia pine------- Loblolly pine-------	70 70 80	4 8 8	Loblolly pine, Virginia pine.
31UB**: Urban land.									
Sassafras------	4A	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar------- Loblolly pine------- Virginia pine-------	70 80 85 70	4 5 8 8	Loblolly pine, eastern white pine, yellow-poplar.
33B**: Sunnyside------	4A	Slight	Slight	Slight	Slight	White oak---------- Virginia pine------- Yellow-poplar-------	80 80 90	4 8 6	Loblolly pine, yellow-poplar, eastern white pine.
Christiana-----	4C	Slight	Moderate	Slight	Slight	White oak---------- Virginia pine------- Sweetgum-----------	70 70 75	4 8 5	Loblolly pine, Virginia pine.
33C**: Sunnyside------	4A	Slight	Slight	Slight	Slight	White oak---------- Virginia pine------- Yellow-poplar-------	80 80 90	4 8 6	Loblolly pine, yellow-poplar, eastern white pine.
Christiana-----	4C	Moderate	Moderate	Slight	Slight	White oak---------- Virginia pine------- Sweetgum-----------	70 70 75	4 8 5	Loblolly pine, Virginia pine.
33UB**: Urban land.									

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
33UB**:									
Sunnyside------	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Loblolly pine, yellow-poplar, eastern white pine.
						Virginia pine-------	80	8	
						Yellow-poplar-------	90	6	
33UC**:									
Sunnyside------	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Loblolly pine, yellow-poplar, eastern white pine.
						Virginia pine-------	80	8	
						Yellow-poplar-------	90	6	
Urban land.									
34UB**:									
Urban land.									
Sunnyside------	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Loblolly pine, yellow-poplar, eastern white pine.
						Virginia pine-------	80	8	
						Yellow-poplar-------	90	6	
Christiana-----	4C	Slight	Moderate	Slight	Slight	White oak----------	70	4	Loblolly pine, Virginia pine.
						Virginia pine-------	70	8	
						Sweetgum-----------	75	5	
34UC**:									
Urban land.									
Sunnyside------	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Loblolly pine, yellow-poplar, eastern white pine.
						Virginia pine-------	80	8	
						Yellow-poplar-------	90	6	
Christiana-----	4C	Moderate	Moderate	Slight	Slight	White oak----------	70	4	Loblolly pine, Virginia pine.
						Virginia pine-------	70	8	
						Sweetgum-----------	75	5	
35B, 35C-------- Sunnyside	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Loblolly pine, yellow-poplar, eastern white pine.
						Virginia pine-------	80	8	
						Yellow-poplar-------	90	6	
36UB**:									
Sunnyside------	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Loblolly pine, yellow-poplar, eastern white pine.
						Virginia pine-------	80	8	
						Yellow-poplar-------	90	6	
Urban land.									
41E, 42E-------- Udorthents	4W	Moderate	Moderate	Moderate	Slight	Sweetgum-----------	40	4	Loblolly pine.
						Red maple----------	40	2	
						Willow oak---------	50	2	
						Loblolly pine-------	60	5	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
45UB**:									
Woodstown------	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Yellow-poplar, eastern white pine, sweetgum.
						Yellow-poplar-------	90	6	
						Sweetgum-----------	90	7	
						Northern red oak----	---	---	
						Black oak----------	---	---	
Urban land.									
46UB**:									
Urban land.									
Woodstown------	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Yellow-poplar, eastern white pine, sweetgum.
						Yellow-poplar-------	90	6	
						Sweetgum-----------	90	7	
						Northern red oak----	---	---	
						Black oak----------	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1UB*:					
Baile	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
2B*:					
Beltsville	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Moderate: wetness.
Keyport	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
2UB*:					
Beltsville	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Moderate: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
2UC*:					
Beltsville	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
3UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Beltsville	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Moderate: wetness.
Keyport	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
4UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Beltsville	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Moderate: wetness.
5E Brandywine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
6B Chester	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
6UB*:					
Chester	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
7UB*:					
Christiana	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope.	Slight	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
7UC*:					
Christiana	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
8UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Christiana	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope.	Slight	Slight.
9UB*:					
Elkton	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
10 Fluvents	Severe: flooding.	Moderate: flooding, small stones.	Severe: small stones, flooding.	Severe: erodes easily.	Severe: flooding.
11B Galestown	Slight	Slight	Moderate: slope, small stones.	Slight	Severe: droughty.
11UB*:					
Galestown	Slight	Slight	Moderate: slope, small stones.	Slight	Severe: droughty.
Urban land	Variable	Variable	Variable	Variable	Variable.
12A, 12B Jackland	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
12UB*:					
Jackland	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
13B Joppa	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
13C Joppa	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13E--- Joppa	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
13UB*:					
Joppa---	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight---	Moderate: small stones, droughty.
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
13UC*:					
Joppa---	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight---	Moderate: small stones, droughty, slope.
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
14UB*:					
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
Joppa---	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight---	Moderate: small stones, droughty.
15B--- Keyport	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
15UB*:					
Keyport---	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
16UB*:					
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
Keyport---	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
17B--- Legore	Slight---	Slight---	Moderate: slope, small stones.	Slight---	Slight.
17C--- Legore	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight---	Moderate: slope.
17E--- Legore	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
18B--- Legore	Slight---	Slight---	Moderate: large stones, small stones, slope.	Slight---	Moderate: large stones.
18C--- Legore	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight---	Moderate large stones.
18E--- Legore	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
18UB*:					
Legore	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
18UC*:					
Legore	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
18UE*:					
Legore	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
19UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Legore	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
19UC*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Legore	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
20B	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Leonardtown					
20UB*:					
Leonardtown	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
21C	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Manor					
21E	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Manor					
22UB*:					
Manor	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
22UC*:					
Manor	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
22UC*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
23UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Manor	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
24UB*:					
Matapeake	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Moderate: erodes easily.	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
25B Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
25UB*:					
Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
26B Montalto	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
26C Montalto	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight	Moderate: large stones, slope.
26UB*:					
Montalto	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
26UC*:					
Montalto	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
27UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
27UB*:					
Montalto	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
28B					
Relay	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Slight	Moderate: large stones.
28C					
Relay	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight	Moderate: large stones, slope.
28E					
Relay	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
28UB*:					
Relay	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
28UC*:					
Relay	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
28UE*:					
Relay	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
29B					
Sassafras	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
29C					
Sassafras	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
29UB*:					
Sassafras	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
Urban land	Variable	Variable	Variable	Variable	Variable.
29UC*:					
Sassafras	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
30B*:					
Sassafras	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
Joppa	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
31UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sassafras	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
32. Sulfaquepts					
33B*:					
Sunnyside	Slight	Slight	Moderate: slope.	Slight	Slight.
Christiana	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope.	Slight	Slight.
33C*:					
Sunnyside	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Christiana	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
33UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Slight	Slight	Moderate: slope.	Slight	Slight.
33UC*:					
Sunnyside	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
34UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Slight	Slight	Moderate: slope.	Slight	Slight.
Christiana	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope.	Slight	Slight.
34UC*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
34UC*: Christiana	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
35B Sunnyside	Slight	Slight	Moderate: slope.	Slight	Slight.
35C Sunnyside	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
36UB*: Sunnyside	Slight	Slight	Moderate: slope.	Slight	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
37. Sulfaquepts					
38C Udorthents	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
39B Udorthents	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
39C. Udorthents					
39E Udorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
40B Udorthents	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
40C Udorthents	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
40E Udorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
41E Udorthents	Severe: slope, small stones, wetness.	Severe: slope, wetness, small stones.	Severe: slope.	Severe: wetness, slope.	Severe: small stones, wetness, droughty.
42*: Udorthents	Severe: flooding, wetness.	Moderate: wetness, small stones, percs slowly.	Severe: small stones, wetness.	Moderate: wetness.	Severe: droughty.
Fluvents	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Severe: erodes easily.	Moderate: small stones, droughty, flooding.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
42E---------- Udorthents	Severe: slope, small stones, wetness.	Severe: slope, wetness, small stones.	Severe: slope.	Severe: wetness.	Severe: small stones, wetness, droughty.
43U*:					
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Udorthents----------	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
44UC*---------- Urban land	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
45UB*:					
Woodstown----------	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight----------	Slight.
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
46UB*:					
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Woodstown----------	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight----------	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1UB*:										
Baile	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Poor.
Urban land.										
2B*:										
Beltsville	Good	Good	Good	Good	Poor	Poor	Poor	Good	Good	Poor.
Keyport	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
2UB*:										
Beltsville	Good	Good	Good	Good	Poor	Poor	Poor	Good	Good	Poor.
Urban land.										
2UC*:										
Beltsville	Very poor.	Poor	Good	Good	Poor	Very poor.	Very poor.	Poor	Good	Very poor.
Urban land.										
3UB*:										
Urban land.										
Beltsville	Good	Good	Good	Good	Poor	Poor	Poor	Good	Good	Poor.
Keyport	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
4UB*:										
Urban land.										
Beltsville	Good	Good	Good	Good	Poor	Poor	Poor	Good	Good	Poor.
5E	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Brandywine										
6B	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Chester										
6UB*:										
Chester	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
7UB*:										
Christiana	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
7UC*:										
Christiana	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
8UB*:										
Urban land.										
Christiana	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
9UB*:										
Elkton	Poor	Fair	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair.
Urban land.										
10 Fluvents	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
11B Galestown	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
11UB*:										
Galestown	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Urban land.										
12A Jackland	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
12B Jackland	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
12UB*:										
Jackland	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
13B, 13C Joppa	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
13E Joppa	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
13UB*, 13UC*:										
Joppa	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
14UB*:										
Urban land.										

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
14UB*:										
Joppa	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
15B---------- Keyport	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
15UB*:										
Keyport	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Urban land.										
16UB*:										
Urban land.										
Keyport	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
17B, 17C---------- Legore	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
17E---------- Legore	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
18B, 18C---------- Legore	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
18E---------- Legore	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
18UB*, 18UC*:										
Legore	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
18UE*:										
Legore	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
19UB*, 19UC*:										
Urban land.										
Legore	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
20B---------- Leonardtown	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
20UB*:										
Leonardtown	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Urban land.										

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
21C---------- Manor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
21E---------- Manor	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
22UB*: Manor----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
22UC*: Manor----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
23UB*: Urban land.										
Manor----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
24UB*: Matapeake---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
25B---------- Mattapex	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
25UB*: Mattapex----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
26B---------- Montalto	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
26C---------- Montalto	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
26UB*: Montalto----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
26UC*: Montalto----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
27UB*:										
Urban land.										
Montalto	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
28B, 28C, 28E----- Relay	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
28UB*:										
Relay	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
28UC*:										
Relay	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
28UE*:										
Relay	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
29B----- Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
29C----- Sassafras	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
29UB*:										
Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
29UC*:										
Sassafras	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
30B*:										
Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Joppa	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
31UB*:										
Urban land.										
Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
32. Sulfaquepts										
33B*:										
Sunnyside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Christiana	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
33C*:										
Sunnyside	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Christiana	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
33UB*: Urban land.										
Sunnyside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
33UC*:										
Sunnyside	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
34UB*: Urban land.										
Sunnyside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Christiana	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
34UC*: Urban land.										
Sunnyside	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Christiana	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
35B Sunnyside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
35C Sunnyside	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
36UB*:										
Sunnyside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
36UB*: Urban land.										
37. Sulfaquepts										
38C, 39B, 39C, 39E, 40B, 40C, 40E. Udorthents										
41E---------- Udorthents	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Poor	Fair	Fair.
42*: Udorthents.										
Fluvents----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
42E---------- Udorthents	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Poor	Fair	Fair.
43U*: Urban land.										
Udorthents.										
44UC*. Urban land										
45UB*: Woodstown---------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	
Urban land.										
46UB*: Urban land.										
Woodstown---------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1UB*:						
Baile	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
2B*:						
Beltsville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
Keyport	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
2UB*:						
Beltsville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
2UC*:						
Beltsville	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: frost action.	Moderate: wetness, slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
3UB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Beltsville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
Keyport	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
4UB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Beltsville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
5E	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Brandywine						

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
6B---------- Chester	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Moderate: large stones.
6UB*: Chester----------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Moderate: large stones.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
7UB*: Christiana-------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
7UC*: Christiana-------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
8UB*: Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
Christiana-------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
9UB*: Elkton----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
10---------- Fluvents	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
11B---------- Galestown	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
11UB*: Galestown--------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
12A, 12B---------- Jackland	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
12UB*:						
Jackland	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
13B						
Joppa	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: small stones, droughty.
13C						
Joppa	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, droughty, slope.
13E						
Joppa	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
13UB*:						
Joppa	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: small stones, droughty.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
13UC*:						
Joppa	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, droughty, slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
14UB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Joppa	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: small stones, droughty.
15B						
Keyport	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
15UB*:						
Keyport	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
16UB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
16UB*:						
Keyport	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
17B	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Legore						
17C	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Legore						
17E	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Legore						
18B	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: large stones.
Legore						
18C	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
Legore						
18E	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Legore						
18UB*:						
Legore	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
18UC*:						
Legore	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
18UE*:						
Legore	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
19UB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Legore	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
19UC*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Legore	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
20B---------- Leonardtown	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
20UB*:						
Leonardtown------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
21C---------- Manor	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
21E---------- Manor	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
22UB*:						
Manor----------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
22UC*:						
Manor----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
23UB*:						
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
Manor----------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
24UB*:						
Matapeake--------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
25B---------- Mattapex	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
25UB*:						
Mattapex---------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
26B---------- Montalto	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
26C---------- Montalto	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: large stones, slope.
26UB*: Montalto----------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
26UC*: Montalto----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
27UB*: Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
Montalto----------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
28B---------- Relay	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones.
28C---------- Relay	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
28E---------- Relay	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
28UB*: Relay----------	Moderate: depth to rock, cutbanks cave.	Moderate: shrink-swell.	Moderate: depth to rock.	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
28UC*: Relay----------	Moderate: depth to rock, cutbanks cave, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
28UE*: Relay----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
29B---------- Sassafras	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones.
29C---------- Sassafras	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, large stones, slope.
29UB*: Sassafras--------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
29UC*: Sassafras--------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, large stones, slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
30B*: Sassafras--------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones.
Joppa------------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: small stones, droughty.
31UB*: Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
Sassafras--------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones.
32. Sulfaquepts						
33B*: Sunnyside--------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
Christiana-------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
33C*: Sunnyside--------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Christiana-------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
33UB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
33UC*:						
Sunnyside	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
34UB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Christiana	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
34UC*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Christiana	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
35B--- Sunnyside	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
35C--- Sunnyside	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
36UB*:						
Sunnyside	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
37. Sulfaquepts						
38C--- Udorthents	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
39B--- Udorthents	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
39C. Udorthents						
39E---------- Udorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
40B---------- Udorthents	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
40C---------- Udorthents	Moderate: wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.
40E---------- Udorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
41E---------- Udorthents	Severe: cutbanks cave, wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: small stones, wetness, droughty.
42*: Udorthents-------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: droughty.
Fluvents---------	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: small stones, droughty, flooding.
42E---------- Udorthents	Severe: cutbanks cave, wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: small stones, wetness, droughty.
43U*: Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
Udorthents-------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: droughty.
44UC*---------- Urban land	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
45UB*: Woodstown--------	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
46UB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Woodstown	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1UB*:					
Baile	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
2B*:					
Beltsville	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Keyport	Severe: wetness, percs slowly.	Moderate: slope.	Severe: seepage, wetness.	Moderate: wetness.	Poor: too clayey, hard to pack.
2UB*:					
Beltsville	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
2UC*:					
Beltsville	Severe: wetness, percs slowly.	Severe: seepage, slope.	Severe: seepage, wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
3UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Beltsville	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Keyport	Severe: wetness, percs slowly.	Moderate: slope.	Severe: seepage, wetness.	Moderate: wetness.	Poor: too clayey, hard to pack.
4UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Beltsville	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
5E	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope.
Brandywine					

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
6B---------- Chester	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, small stones.
6UB*: Chester----------	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, small stones.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
7UB*: Christiana---------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, hard to pack.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
7UC*: Christiana---------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
8UB*: Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Christiana---------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, hard to pack.
9UB*: Elkton----------	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
10---------- Fluvents	Severe: flooding, wetness.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: small stones, wetness.
11B---------- Galestown	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
11UB*: Galestown----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
12A---------- Jackland	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
12B---------- Jackland	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
12UB*: Jackland----------	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
13B---------- Joppa	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
13C---------- Joppa	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
13E---------- Joppa	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
13UB*: Joppa----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
13UC*: Joppa----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
14UB*: Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Joppa----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
15B---------- Keyport	Severe: wetness, percs slowly.	Moderate: slope.	Severe: seepage, wetness.	Moderate: wetness.	Poor: too clayey, hard to pack.
15UB*: Keyport----------	Severe: wetness, percs slowly.	Moderate: slope.	Severe: seepage, wetness.	Moderate: wetness.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
16UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Keyport	Severe: wetness, percs slowly.	Moderate: slope.	Severe: seepage, wetness.	Moderate: wetness.	Poor: too clayey, hard to pack.
17B	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
17C	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
17E	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
18B	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
18C	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
18E	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
18UB*:					
Legore	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable	Variable.
18UC*:					
Legore	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable	Variable.
18UE*:					
Legore	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
19UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Legore	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
19UC*:					
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
19UC*:					
Legore	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
20B	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
20UB*:					
Leonardtown	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
21C	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
21E	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
22UB*:					
Manor	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable	Variable.
22UC*:					
Manor	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable	Variable.
23UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Manor	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
24UB*:					
Matapeake	Severe: percs slowly.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land	Variable	Variable	Variable	Variable	Variable.
25B	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too sandy, wetness.
25UB*:					
Mattapex	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too sandy, wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
26B---------- Montalto	Severe: percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Slight----------	Poor: too clayey, hard to pack.
26C---------- Montalto	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
26UB*: Montalto----------	Severe: percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Slight----------	Poor: too clayey, hard to pack.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
26UC*: Montalto----------	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
27UB*: Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Montalto----------	Severe: percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Slight----------	Poor: too clayey, hard to pack.
28B---------- Relay	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, small stones.
28C---------- Relay	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, small stones, slope.
28E---------- Relay	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
28UB*: Relay----------	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: hard to pack.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
28UC*: Relay----------	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: hard to pack.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28UE*:					
Relay	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: hard to pack, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
29B	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
29C	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
29UB*:					
Sassafras	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
Urban land	Variable	Variable	Variable	Variable	Variable.
29UC*:					
Sassafras	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
Urban land	Variable	Variable	Variable	Variable	Variable.
30B*:					
Sassafras	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
Joppa	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
31UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sassafras	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
32. Sulfaquepts					
33B*:					
Sunnyside	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
Christiana	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
33C*:					
Sunnyside	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
33C*:					
Christiana	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
33UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
33UC*:					
Sunnyside	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
Urban land	Variable	Variable	Variable	Variable	Variable.
34UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
Christiana	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
34UC*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
Christiana	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
35B Sunnyside	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
35C Sunnyside	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
36UB*:					
Sunnyside	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
Urban land	Variable	Variable	Variable	Variable	Variable.
37. Sulfaquepts					
38C Udorthents	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Slight	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
39B---------- Udorthents	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, wetness.	Moderate: depth to rock.	Fair: depth to rock, too clayey.
39C. Udorthents					
39E---------- Udorthents	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, wetness, slope.	Severe: slope.	Poor: slope.
40B---------- Udorthents	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Slight----------	Good.
40C---------- Udorthents	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: slope.	Fair: slope.
40E---------- Udorthents	Severe: percs slowly, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Poor: slope.
41E---------- Udorthents	Severe: wetness, poor filter, slope.	Severe: seepage, slope, wetness.	Severe: seepage, wetness, slope.	Severe: seepage, wetness, slope.	Poor: seepage, too sandy, slope.
42*: Udorthents---------	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, small stones, wetness.
Fluvents----------	Severe: flooding, wetness.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: small stones, wetness.
42E---------- Udorthents	Severe: wetness, poor filter, slope.	Severe: seepage, slope, wetness.	Severe: seepage, wetness, slope.	Severe: seepage, wetness, slope.	Poor: seepage, too sandy, slope.
43U*: Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Udorthents---------	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, small stones, wetness.
44UC*---------- Urban land	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
45UB*: Woodstown----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Good.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
46UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Woodstown	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1UB*:				
Baile	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Urban land	Variable	Variable	Variable	Variable.
2B*:				
Beltsville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, small stones.
Keyport	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
2UB*, 2UC*:				
Beltsville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, small stones.
Urban land	Variable	Variable	Variable	Variable.
3UB*:				
Urban land	Variable	Variable	Variable	Variable.
Beltsville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, small stones.
Keyport	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
4UB*:				
Urban land	Variable	Variable	Variable	Variable.
Beltsville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, small stones.
5E Brandywine	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, small stones, slope.
6B Chester	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
6UB*:				
Chester	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable.
7UB*, 7UC*:				
Christiana	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land	Variable	Variable	Variable	Variable.
8UB*:				
Urban land	Variable	Variable	Variable	Variable.
Christiana	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
9UB*:				
Elkton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Urban land	Variable	Variable	Variable	Variable.
10 Fluvents	Good	Probable	Improbable: too sandy.	Poor: small stones.
11B Galestown	Good	Probable	Improbable: too sandy.	Poor: too sandy.
11UB*:				
Galestown	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land	Variable	Variable	Variable	Variable.
12A, 12B Jackland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
12UB*:				
Jackland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land	Variable	Variable	Variable	Variable.
13B, 13C Joppa	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
13E Joppa	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
13UB*, 13UC*:				
Joppa	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Urban land	Variable	Variable	Variable	Variable.
14UB*:				
Urban land	Variable	Variable	Variable	Variable.
Joppa	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
15B	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Keyport				
15UB*:				
Keyport	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land	Variable	Variable	Variable	Variable.
16UB*:				
Urban land	Variable	Variable	Variable	Variable.
Keyport	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
17B, 17C	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Legore				
17E	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Legore				
18B, 18C	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Legore				
18E	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Legore				
18UB*, 18UC*:				
Legore	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Urban land	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
18UE*:				
Legore	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Urban land	Variable	Variable	Variable	Variable.
19UB*, 19UC*:				
Urban land	Variable	Variable	Variable	Variable.
Legore	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
20B Leonardtown	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.
20UB*:				
Leonardtown	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.
Urban land	Variable	Variable	Variable	Variable.
21C Manor	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
21E Manor	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
22UB*, 22UC*:				
Manor	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Urban land	Variable	Variable	Variable	Variable.
23UB*:				
Urban land	Variable	Variable	Variable	Variable.
Manor	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
24UB*:				
Matapeake	Good	Probable	Improbable: too sandy.	Fair: too clayey.
Urban land	Variable	Variable	Variable	Variable.
25B Mattapex	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too clayey.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
25UB*:				
Mattapex	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too clayey.
Urban land	Variable	Variable	Variable	Variable.
26B	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Montalto				
26C	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Montalto				
26UB*, 26UC*:				
Montalto	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land	Variable	Variable	Variable	Variable.
27UB*:				
Urban land	Variable	Variable	Variable	Variable.
Montalto	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
28B, 28C	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Relay				
28E	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Relay				
28UB*, 28UC*:				
Relay	Fair: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable.
28UE*:				
Relay	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Urban land	Variable	Variable	Variable	Variable.
29B, 29C	Good	Probable	Probable	Poor: small stones.
Sassafras				
29UB*, 29UC*:				
Sassafras	Good	Probable	Probable	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable.
30B*:				
Sassafras	Good	Probable	Probable	Poor: small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
30B*:				
Joppa	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
31UB*:				
Urban land	Variable	Variable	Variable	Variable.
Sassafras	Good	Probable	Probable	Poor: small stones.
32. Sulfaquepts				
33B*:				
Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Christiana	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
33C*:				
Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Christiana	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
33UB*:				
Urban land	Variable	Variable	Variable	Variable.
Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
33UC*:				
Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Urban land	Variable	Variable	Variable	Variable.
34UB*:				
Urban land	Variable	Variable	Variable	Variable.
Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Christiana	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
34UC*:				
Urban land	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
34UC*:				
Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Christiana	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
35B---- Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
35C---- Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
36UB*:				
Sunnyside	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Urban land	Variable	Variable	Variable	Variable.
37. Sulfaquepts				
38C---- Udorthents	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
39B---- Udorthents	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
39C. Udorthents				
39E---- Udorthents	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
40B---- Udorthents	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
40C---- Udorthents	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
40E---- Udorthents	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
41E---- Udorthents	Poor: wetness, slope.	Probable	Improbable: too sandy.	Poor: too sandy, small stones, wetness.
42*:				
Udorthents	Fair: wetness.	Improbable: small stones.	Probable	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
42*:				
Fluvents	Good	Probable	Improbable: too sandy.	Poor: small stones.
42E Udorthents	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, small stones, wetness.
43U*:				
Urban land	Variable	Variable	Variable	Variable.
Udorthents	Fair: wetness.	Improbable: small stones.	Probable	Poor: area reclaim, small stones.
44UC* Urban land	Variable	Variable	Variable	Variable.
45UB*:				
Woodstown	Fair: wetness, frost action.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Urban land	Variable	Variable	Variable	Variable.
46UB*:				
Urban land	Variable	Variable	Variable	Variable.
Woodstown	Fair: wetness, frost action.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
1UB*:					
Baile	Moderate: slope.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action, slope.	Wetness, erodes easily, percs slowly.
Urban land	Variable	Variable	Variable	Variable	Variable.
2B*:					
Beltsville	Severe: seepage.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, rooting depth.
Keyport	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, percs slowly.
2UB*:					
Beltsville	Severe: seepage.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, rooting depth.
Urban land	Variable	Variable	Variable	Variable	Variable.
2UC*:					
Beltsville	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, rooting depth.
Urban land	Variable	Variable	Variable	Variable	Variable.
3UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Beltsville	Severe: seepage.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, rooting depth.
Keyport	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, percs slowly.
4UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Beltsville	Severe: seepage.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, rooting depth.
5E	Severe: seepage, slope.	Moderate: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.
Brandywine					

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
6B---------- Chester	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water----	Erodes easily.
6UB*: Chester----------	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water----	Erodes easily.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
7UB*: Christiana-------	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water----	Erodes easily, percs slowly.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
7UC*: Christiana-------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water----	Slope, erodes easily, percs slowly.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
8UB*: Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Christiana-------	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water----	Erodes easily, percs slowly.
9UB*: Elkton----------	Slight----------	Severe: piping, wetness.	Severe: slow refill.	Percs slowly-----	Wetness, erodes easily, percs slowly.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
10---------- Fluvents	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water----	Erodes easily, droughty.
11B---------- Galestown	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water----	Droughty.
11UB*: Galestown--------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water----	Droughty.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
12A---------- Jackland	Moderate: seepage.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.
12B---------- Jackland	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
12UB*:					
Jackland	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly.
Urban land	Variable	Variable	Variable	Variable	Variable.
13B Joppa	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, rooting depth.
13C, 13E Joppa	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, rooting depth.
13UB*:					
Joppa	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, rooting depth.
Urban land	Variable	Variable	Variable	Variable	Variable.
13UC*:					
Joppa	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, rooting depth.
Urban land	Variable	Variable	Variable	Variable	Variable.
14UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Joppa	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, rooting depth.
15B Keyport	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, percs slowly.
15UB*:					
Keyport	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, percs slowly.
Urban land	Variable	Variable	Variable	Variable	Variable.
16UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Keyport	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, percs slowly.
17B Legore	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable.
17C, 17E Legore	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
18B---------- Legore	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water----	Large stones.
18C, 18E---------- Legore	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water----	Large stones, slope.
18UB*:					
Legore----------	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water----	Favorable.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
18UC*, 18UE*:					
Legore----------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water----	Slope.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
19UB*:					
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Legore----------	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water----	Favorable.
19UC*:					
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Legore----------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water----	Slope.
20B---------- Leonardtown	Severe: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, erodes easily, rooting depth.
20UB*:					
Leonardtown------	Severe: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, erodes easily, rooting depth.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
21C, 21E---------- Manor	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water----	Slope, erodes easily.
22UB*:					
Manor----------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water----	Erodes easily.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
22UC*:					
Manor	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, erodes easily.
Urban land	Variable	Variable	Variable	Variable	Variable.
23UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Manor	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Erodes easily.
24UB*:					
Matapeake	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Erodes easily.
Urban land	Variable	Variable	Variable	Variable	Variable.
25B Mattapex	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Slope, cutbanks cave.	Erodes easily.
25UB*:					
Mattapex	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Slope, cutbanks cave.	Erodes easily.
Urban land	Variable	Variable	Variable	Variable	Variable.
26B Montalto	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly.
26C Montalto	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.
26UB*:					
Montalto	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly.
Urban land	Variable	Variable	Variable	Variable	Variable.
26UC*:					
Montalto	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.
Urban land	Variable	Variable	Variable	Variable	Variable.
27UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
27UB*:					
Montalto	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly.
28B	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable.
28C, 28E	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope.
28UB*:					
Relay	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable.
Urban land	Variable	Variable	Variable	Variable	Variable.
28UC*, 28UE*:					
Relay	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
29B	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily.
29C	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.
29UB*:					
Sassafras	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily.
Urban land	Variable	Variable	Variable	Variable	Variable.
29UC*:					
Sassafras	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.
Urban land	Variable	Variable	Variable	Variable	Variable.
30B*:					
Sassafras	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily.
Joppa	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, rooting depth.
31UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
31UB*:					
Sassafras	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily.
32. Sulfaquepts					
33B*:					
Sunnyside	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable.
Christiana	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.
33C*:					
Sunnyside	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope.
Christiana	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.
33UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable.
33UC*:					
Sunnyside	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
34UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable.
Christiana	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.
34UC*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Sunnyside	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope.
Christiana	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
35B---------- Sunnyside	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water----	Favorable.
35C---------- Sunnyside	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water----	Slope.
36UB*:					
Sunnyside--------	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water----	Favorable.
Urban land-------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
37. Sulfaquepts					
38C---------- Udorthents	Moderate: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water----	Percs slowly.
39B---------- Udorthents	Moderate: depth to rock, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water----	Erodes easily, percs slowly.
39C. Udorthents					
39E---------- Udorthents	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water----	Slope, erodes easily, percs slowly.
40B---------- Udorthents	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water----	Percs slowly.
40C, 40E---------- Udorthents	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water----	Slope, percs slowly.
41E---------- Udorthents	Severe: seepage, slope.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave.	Wetness, slope, droughty.
42*:					
Udorthents-------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, droughty.
Fluvents---------	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water----	Erodes easily, droughty.
42E---------- Udorthents	Severe: seepage, slope.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave.	Wetness, slope, droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Grassed waterways
43U*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Udorthents	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, erodes easily, droughty.
44UC*: Urban land	Variable	Variable	Variable	Variable	Variable.
45UB*:					
Woodstown	Moderate: seepage, slope.	Severe: thin layer, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Favorable.
Urban land	Variable	Variable	Variable	Variable	Variable.
46UB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Woodstown	Moderate: seepage, slope.	Severe: thin layer, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Favorable.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
1UB*:											
Baile	0-18	Loam	ML, MH	A-4, A-6, A-7	0-10	85-100	80-100	70-100	50-95	33-67	7-24
	18-35	Silty clay loam, silt loam, clay loam.	CL	A-6	0	90-100	80-100	70-100	55-95	28-34	11-14
	35-65	Loam, sandy loam, silt loam.	ML, CL, SC, SM	A-2, A-4, A-6	0	80-100	80-100	50-100	25-90	<35	NP-11
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
2B*:											
Beltsville	0-12	Loam	ML, CL-ML	A-4	0	85-100	80-100	70-100	50-90	22-26	3-7
	12-20	Silty clay loam, silt loam.	CL	A-4, A-6	0	85-100	80-100	70-100	55-95	29-32	9-12
	20-45	Silty clay loam, silt loam, loam.	CL	A-6, A-4	0	85-100	80-100	70-100	50-95	29-34	9-14
	45-65	Gravelly sandy loam, sandy loam, clay loam.	SM, ML, CL, GM	A-2, A-4, A-6, A-1-b	0	60-100	50-100	30-100	15-90	18-34	3-16
Keyport	0-4	Loam	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	65-85	20-30	3-10
	4-48	Silty clay loam, clay loam, clay.	ML, CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	70-95	35-55	10-30
	48-65	Stratified clay to loamy sand.	SC-SM, SC, CL-ML, CL	A-6, A-4, A-2, A-7	0	95-100	95-100	60-95	25-85	15-55	NP-30
2UB*, 2UC*:											
Beltsville	0-12	Loam	ML, CL-ML	A-4	0	85-100	80-100	70-100	50-90	22-26	3-7
	12-20	Silty clay loam, silt loam.	CL	A-4, A-6	0	85-100	80-100	70-100	55-95	29-32	9-12
	20-45	Silty clay loam, silt loam, loam.	CL	A-6, A-4	0	85-100	80-100	70-100	50-95	29-34	9-14
	45-65	Gravelly sandy loam, sandy loam, clay loam.	SM, ML, CL, GM	A-2, A-4, A-6, A-1-b	0	60-100	50-100	30-100	15-90	18-34	3-16
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
3UB*:											
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
Beltsville	0-12	Loam	ML, CL-ML	A-4	0	85-100	80-100	70-100	50-90	22-26	3-7
	12-20	Silty clay loam, silt loam.	CL	A-4, A-6	0	85-100	80-100	70-100	55-95	29-32	9-12
	20-45	Silty clay loam, silt loam, loam.	CL	A-6, A-4	0	85-100	80-100	70-100	50-95	29-34	9-14
	45-65	Gravelly sandy loam, sandy loam, clay loam.	SM, ML, CL, GM	A-2, A-4, A-6, A-1-b	0	60-100	50-100	30-100	15-90	18-34	3-16

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
3UB*:											
Keyport---------	0-4	Loam----------	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	65-85	20-30	3-10
	4-48	Silty clay loam, clay loam, clay.	ML, CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	70-95	35-55	10-30
	48-65	Stratified clay to loamy sand.	SC-SM, SC, CL-ML, CL	A-6, A-4, A-2, A-7	0	95-100	95-100	60-95	25-85	15-55	NP-30
4UB*:											
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
Beltsville------	0-12	Loam----------	ML, CL-ML	A-4	0	85-100	80-100	70-100	50-90	22-26	3-7
	12-20	Silty clay loam, silt loam.	CL	A-4, A-6	0	85-100	80-100	70-100	55-95	29-32	9-12
	20-45	Silty clay loam, silt loam, loam.	CL	A-6, A-4	0	85-100	80-100	70-100	50-95	29-34	9-14
	45-65	Gravelly sandy loam, sandy loam, clay loam.	SM, ML, CL, GM	A-2, A-4, A-6, A-1-b	0	60-100	50-100	30-100	15-90	18-34	3-16
5E---------- Brandywine	0-6	Loam----------	ML, SM, CL-ML, SC-SM	A-4, A-6	0	85-95	75-85	65-80	45-65	21-39	2-11
	6-19	Gravelly loam, loam, sandy loam.	SM, ML, GM, CL-ML	A-2, A-4	0-25	55-95	45-85	35-80	30-65	15-35	NP-10
	19-25	Very gravelly coarse sand, very gravelly loamy sand, gravelly loamy sand.	GW, GP, GM, SP	A-1	0-65	20-55	10-45	5-35	2-15	---	NP
	25-65	Extremely gravelly coarse sand, gravelly coarse sand, very gravelly loamy sand.	GW, GP, GM, SP	A-1	0-65	20-55	10-45	5-35	2-15	---	NP
6B---------- Chester	0-8	Loam----------	CL, CL-ML	A-4	0-10	85-100	80-100	70-100	50-90	22-27	5-10
	8-38	Silty clay loam, silt loam, clay loam, loam.	ML, CL	A-4, A-6, A-7	0-10	85-100	80-100	70-100	55-95	30-50	8-17
	38-65	Silt loam, loam, sandy loam.	SM, ML	A-2, A-4, A-7	0-10	80-100	80-100	60-100	30-90	<47	4-12
6UB*:											
Chester---------	0-8	Loam----------	CL, CL-ML	A-4	0-10	85-100	80-100	70-100	50-90	22-27	5-10
	8-38	Silty clay loam, silt loam, clay loam, loam.	ML, CL	A-4, A-6, A-7	0-10	85-100	80-100	70-100	55-95	30-50	8-17
	38-65	Silt loam, loam, sandy loam.	SM, ML	A-2, A-4, A-7	0-10	80-100	80-100	60-100	30-90	<47	4-12
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
7UB*, 7UC*:											
Christiana------	0-11	Loam----------	CL-ML, CL, SC	A-4, A-2-4	0	90-100	80-100	55-100	30-90	22-30	5-9
	11-65	Clay, silty clay, clay loam.	CL, CH	A-7	0	90-100	80-100	70-100	60-95	40-59	17-31
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
8UB*:											
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
Christiana------	0-11	Loam----------	CL-ML, CL, SC	A-4, A-2-4	0	90-100	80-100	55-100	30-90	22-30	5-9
	11-65	Clay, silty clay, clay loam.	CL, CH	A-7	0	90-100	80-100	70-100	60-95	40-59	17-31
9UB*:											
Elkton----------	0-5	Silt loam--------	ML, CL-ML	A-4, A-6	0	100	100	90-100	50-95	25-45	5-15
	5-14	Silty clay loam	CL	A-6	0	100	100	90-100	85-95	25-40	10-20
	14-65	Silty clay loam, silty clay.	CL, CH	A-6, A-7	0	100	100	95-100	85-95	30-55	10-35
	65-70	Very fine sandy loam.	SC, ML, CL	A-4	0	100	95-100	85-95	45-75	20-30	NP-10
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
10--------------- Fluvents	0-5	Gravelly sandy loam.	ML, CL-ML, GM, SM	A-4	0-5	75-100	60-100	50-80	35-60	10-20	NP-5
	5-25	Sandy loam, silt loam, gravelly loam.	ML, CL-ML, GM, SM	A-4	0-10	75-100	60-100	50-90	35-80	10-25	NP-6
	25-65	Stratified sandy loam to gravelly loam.	SM, ML, SP-SM	A-2, A-4, A-3	---	90-100	70-90	50-95	5-60	<30	2-15
11B--------------- Galestown	0-7	Loamy sand-------	SP-SM, SM	A-1, A-2, A-3	0	95-100	75-100	45-70	4-20	---	NP
	7-50	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-1, A-2, A-3	0	95-100	95-100	45-75	4-20	---	NP
	50-65	Sand, loamy sand, gravelly sand.	SP, SP-SM	A-1, A-3, A-2	0	75-100	55-100	30-75	4-10	---	NP
11UB*:											
Galestown-------	0-7	Loamy sand-------	SP-SM, SM	A-1, A-2, A-3	0	95-100	75-100	45-70	4-20	---	NP
	7-50	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-1, A-2, A-3	0	95-100	95-100	45-75	4-20	---	NP
	50-65	Sand, loamy sand, gravelly sand.	SP, SP-SM	A-1, A-3, A-2	0	75-100	55-100	30-75	4-10	---	NP
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
12A, 12B--------- Jackland	0-8	Silt loam---------	CL	A-6	1-5	95-100	80-100	75-95	51-70	25-40	10-20
	8-41	Clay-------------	CL, CH	A-7, A-6	0	99-100	80-100	70-100	55-95	35-60	20-45
	41-65	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	1-5	95-100	65-95	45-90	40-85	20-40	5-20
12UB*: Jackland--------	0-8	Silt loam---------	CL	A-6	1-5	95-100	80-100	75-95	51-70	25-40	10-20
	8-41	Clay-------------	CL, CH	A-7, A-6	0	99-100	80-100	70-100	55-95	35-60	20-45
	41-65	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	1-5	95-100	65-95	45-90	40-85	20-40	5-20
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
13B, 13C, 13E---- Joppa	0-10	Gravelly sandy loam.	SP-SM, ML, SM	A-1, A-2, A-4	0	60-80	50-75	25-70	10-55	<35	NP
	10-24	Very gravelly sandy loam, gravelly loam.	GP-GM, GM, SM	A-1, A-2, A-4	0	40-80	30-75	20-70	10-55	<30	NP
	24-65	Very gravelly sand, gravelly loamy sand, gravelly sandy loam.	GW, GM, GP, SP	A-1, A-2-4, A-3	0-10	35-75	30-75	15-55	2-30	<20	NP
13UB*, 13UC*: Joppa----------	0-10	Gravelly sandy loam.	SP-SM, ML, SM	A-1, A-2, A-4	0	60-80	50-75	25-70	10-55	<35	NP
	10-24	Very gravelly sandy loam, gravelly loam.	GP-GM, GM, SM	A-1, A-2, A-4	0	40-80	30-75	20-70	10-55	<30	NP
	24-65	Very gravelly sand, gravelly loamy sand, gravelly sandy loam.	GW, GM, GP, SP	A-1, A-2-4, A-3	0-10	35-75	30-75	15-55	2-30	<20	NP
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
14UB*: Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
Joppa----------	0-10	Gravelly sandy loam.	SP-SM, ML, SM	A-1, A-2, A-4	0	60-80	50-75	25-70	10-55	<35	NP
	10-24	Very gravelly sandy loam, gravelly loam.	GP-GM, GM, SM	A-1, A-2, A-4	0	40-80	30-75	20-70	10-55	<30	NP
	24-65	Very gravelly sand, gravelly loamy sand, gravelly sandy loam.	GW, GM, GP, SP	A-1, A-2-4, A-3	0-10	35-75	30-75	15-55	2-30	<20	NP

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
15B---------- Keyport	0-4	Loam----------	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	65-85	20-30	3-10
	4-48	Silty clay loam, clay loam, clay.	ML, CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	70-95	35-55	10-30
	48-65	Stratified clay to loamy sand.	SC-SM, SC, CL-ML, CL	A-6, A-4, A-2, A-7	0	95-100	95-100	60-95	25-85	15-55	NP-30
15UB*: Keyport---------	0-4	Loam----------	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	65-85	20-30	3-10
	4-48	Silty clay loam, clay loam, clay.	ML, CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	70-95	35-55	10-30
	48-65	Stratified clay to loamy sand.	SC-SM, SC, CL-ML, CL	A-6, A-4, A-2, A-7	0	95-100	95-100	60-95	25-85	15-55	NP-30
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
16UB*: Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
Keyport---------	0-4	Loam----------	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	65-85	20-30	3-10
	4-48	Silty clay loam, clay loam, clay.	ML, CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	70-95	35-55	10-30
	48-65	Stratified clay to loamy sand.	SC-SM, SC, CL-ML, CL	A-6, A-4, A-2, A-7	0	95-100	95-100	60-95	25-85	15-55	NP-30
17B, 17C, 17E---- Legore	0-12	Loam----------	CL	A-4, A-6	0-5	85-100	80-100	70-100	50-95	<40	7-15
	12-22	Gravelly silty clay loam, clay loam, silty clay loam.	ML, MH, SM	A-7	0-15	80-100	50-100	50-100	40-95	40-65	14-30
	22-65	Gravelly silt loam, silty clay loam, sandy loam, loam.	SM, GM, ML	A-2, A-4, A-5, A-7	0-15	60-100	50-100	45-100	25-95	<50	NP-15
18B, 18C, 18E---- Legore	0-9	Stony loam-------	CL	A-4, A-6	15-30	85-100	80-100	70-100	50-95	<40	7-15
	9-32	Gravelly silty clay loam, clay loam, silty clay loam, loam.	ML, MH, SM	A-7	0-15	80-100	50-100	50-100	40-95	40-65	14-30
	32-65	Gravelly silt loam, silty clay loam, sandy loam.	SM, GM, ML	A-2, A-4, A-5, A-7	0-15	60-100	50-100	45-100	25-95	<50	NP-15

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
18UB*, 18UC*, 18UE*:											
Legore	0-12	Loam	CL	A-4, A-6	0-5	85-100	80-100	70-100	50-95	<40	7-15
	12-22	Gravelly silty clay loam, clay loam, silty clay loam.	ML, MH, SM	A-7	0-15	80-100	50-100	50-100	40-95	40-65	14-30
	22-65	Gravelly silt loam, silty clay loam, sandy loam, loam.	SM, GM, ML	A-2, A-4, A-5, A-7	0-15	60-100	50-100	45-100	25-95	<50	NP-15
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
19UB*, 19UC*:											
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
Legore	0-12	Loam	CL	A-4, A-6	0-5	85-100	80-100	70-100	50-95	<40	7-15
	12-22	Gravelly silty clay loam, clay loam, silty clay loam.	ML, MH, SM	A-7	0-15	80-100	50-100	50-100	40-95	40-65	14-30
	22-65	Gravelly silt loam, silty clay loam, sandy loam.	SM, GM, ML	A-2, A-4, A-5, A-7	0-15	60-100	50-100	45-100	25-95	<50	NP-15
20B---------- Leonardtown	0-15	Silt loam	ML, SM	A-4, A-2-4	0	85-100	80-100	55-100	30-90	<35	5-10
	15-50	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	55-95	<35	5-15
	50-65	Loam, gravelly sandy loam, clay loam.	ML, CL, SM, SC	A-2, A-4, A-6, A-1	0	65-100	50-100	30-100	15-95	<40	3-20
20UB*:											
Leonardtown	0-15	Silt loam	ML, SM	A-4, A-2-4	0	85-100	80-100	55-100	30-90	<35	5-10
	15-50	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	55-95	<35	5-15
	50-65	Loam, gravelly sandy loam, clay loam.	ML, CL, SM, SC	A-2, A-4, A-6, A-1	0	65-100	50-100	30-100	15-95	<40	3-20
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
21C, 21E---------- Manor	0-7	Loam	ML	A-4, A-6	0	85-100	80-100	70-100	50-90	32-40	6-12
	7-35	Loam, silt loam, channery loam.	SM, ML, GM	A-4, A-6, A-2-4, A-2-6	0-10	65-100	50-100	40-100	30-90	26-40	4-12
	35-65	Loam, sandy loam, channery sandy loam.	SM, ML, CL-ML, SC-SM	A-1, A-2, A-4, A-6	0-5	65-100	50-100	30-95	15-75	20-40	2-12

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
22UB*, 22UC*:											
Manor	0-7	Loam	ML	A-4, A-6	0	85-100	80-100	70-100	50-90	32-40	6-12
	7-35	Loam, silt loam, channery loam.	SM, ML, GM	A-4, A-6, A-2-4, A-2-6	0-10	65-100	50-100	40-100	30-90	26-40	4-12
	35-65	Loam, sandy loam, channery sandy loam.	SM, ML, CL-ML, SC-SM	A-1, A-2, A-4, A-6	0-5	65-100	50-100	30-95	15-75	20-40	2-12
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
23UB*:											
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
Manor	0-7	Loam	ML	A-4, A-6	0	85-100	80-100	70-100	50-90	32-40	6-12
	7-35	Loam, silt loam, channery loam.	SM, ML, GM	A-4, A-6, A-2-4, A-2-6	0-10	65-100	50-100	40-100	30-90	26-40	4-12
	35-65	Loam, sandy loam, channery sandy loam.	SM, ML, CL-ML, SC-SM	A-1, A-2, A-4, A-6	0-5	65-100	50-100	30-95	15-75	20-40	2-12
24UB*:											
Matapeake	0-15	Silt loam	ML, CL-ML, SC-SM, CL	A-4	0	100	100	80-100	40-75	18-30	2-9
	15-65	Silt loam, silty clay loam, loam.	CL, ML	A-6	0	100	100	80-100	85-100	27-45	10-22
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
25B	0-12	Silt loam	CL-ML, CL	A-4	0	95-100	90-100	80-100	80-100	15-30	5-15
Mattapex	12-41	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	85-95	24-45	7-21
	41-65	Fine sandy loam, loam, loamy sand, sandy loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	95-100	90-100	45-95	15-75	<40	NP-18
25UB*:											
Mattapex	0-12	Silt loam	CL-ML, CL	A-4	0	95-100	90-100	80-100	80-100	15-30	5-15
	12-41	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	85-95	24-45	7-21
	41-65	Fine sandy loam, loam, loamy sand, sandy loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	95-100	90-100	45-95	15-75	<40	NP-18
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
26B	0-18	Silt loam	ML, CL, CH	A-6, A-7	0-5	95-100	80-100	70-100	50-95	36-52	10-25
Montalto	18-32	Clay, silty clay, clay loam.	CL, CH	A-7	0-5	95-100	80-100	70-100	60-95	40-54	18-27
	32-65	Loam, clay loam, silty clay loam.	ML, CL, CH	A-6, A-7	0-10	90-100	80-100	70-100	50-95	38-52	13-25

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
26C---------- Montalto	0-6	Very stony silt loam.	ML	A-4, A-6	5-10	95-100	80-100	70-100	50-95	32-40	7-12
	6-18	Silt loam, silty clay loam, loam.	ML, CL, CH	A-6, A-7	0-5	95-100	80-100	70-100	50-95	36-52	10-25
	18-32	Clay, silty clay, clay loam.	CL, CH	A-7	0-5	95-100	80-100	70-100	60-95	40-54	18-27
	32-65	Loam, clay loam, silty clay loam.	ML, CL, CH, MH	A-6, A-7	0-10	90-100	80-100	70-100	50-95	38-52	13-25
26UB*, 26UC*: Montalto--------	0-18	Silt loam--------	ML, CL, CH	A-6, A-7	0-5	95-100	80-100	70-100	50-95	36-52	10-25
	18-32	Clay, silty clay, clay loam.	CL, CH	A-7	0-5	95-100	80-100	70-100	60-95	40-54	18-27
	32-65	Loam, clay loam, silty clay loam.	ML, CL, CH	A-6, A-7	0-10	90-100	80-100	70-100	50-95	38-52	13-25
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
27UB*: Urban land------	0-65	Variable---------	---	---	---	---	---	---	---	---	---
Montalto--------	0-18	Silt loam--------	ML, CL, CH	A-6, A-7	0-5	95-100	80-100	70-100	50-95	36-52	10-25
	18-32	Clay, silty clay, clay loam.	CL, CH	A-7	0-5	95-100	80-100	70-100	60-95	40-54	18-27
	32-65	Loam, clay loam, silty clay loam.	ML, CL, CH	A-6, A-7	0-10	90-100	80-100	70-100	50-95	38-52	13-25
28B, 28C, 28E---- Relay	0-15	Very stony silt loam.	CL	A-4, A-6	5-10	95-100	80-100	70-100	50-95	25-33	7-12
	15-65	Silt loam, loam, sandy loam.	CL, CL-ML	A-4	0-10	85-100	80-95	75-90	50-85	19-29	5-10
28UB*, 28UC*, 28UE*: Relay----------	0-30	Silt loam--------	CL	A-4, A-6	0-5	85-100	80-100	70-100	55-95	25-33	7-12
	30-65	Silt loam, loam, sandy loam.	SC, CL, CL-ML	A-4, A-2-4	0-10	85-100	80-100	50-100	25-90	19-29	5-10
Urban land-----	0-60	Variable---------	---	---	---	---	---	---	---	---	---
29B, 29C--------- Sassafras	0-27	Gravelly loam----	SM, CL, ML	A-1, A-2, A-4	0-10	60-85	50-75	30-70	15-55	<32	NP-10
	27-42	Loam, sandy clay loam, sandy loam.	SC-SM, CL, ML	A-2, A-4, A-6	0	85-100	85-100	50-95	25-75	20-33	5-15
	42-65	Gravelly sandy loam, loamy sand, sand.	SP-SM, SC, SM	A-1, A-2, A-4	0	70-100	50-100	30-90	5-50	<26	NP-8

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
29UB*, 29UC*:											
Sassafras-------	0-27	Gravelly loam----	SM, CL, ML	A-1, A-2, A-4	0-10	60-85	50-75	30-70	15-55	<32	NP-10
	27-42	Loam, sandy loam, sandy clay loam.	SC-SM, CL, ML	A-2, A-4, A-6	0	85-100	85-100	50-95	25-75	20-33	5-15
	42-65	Gravelly sandy loam, loamy sand, sand.	SP-SM, SC, SM	A-1, A-2, A-4	0	70-100	50-100	30-90	5-50	<26	NP-8
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
30B*:											
Sassafras-------	0-27	Gravelly loam----	SM, CL, ML	A-1, A-2, A-4	0-10	60-85	50-75	30-70	15-55	<32	NP-10
	27-42	Loam, sandy clay loam, sandy loam.	SC-SM, CL, ML	A-2, A-4, A-6	0	85-100	85-100	50-95	25-75	20-33	5-15
	42-65	Gravelly sandy loam, loamy sand, sand.	SP-SM, SC, SM	A-1, A-2, A-4	0	70-100	50-100	30-90	5-50	<26	NP-8
Joppa-----------	0-10	Gravelly sandy loam.	SP-SM, ML, SM	A-1, A-2, A-4	0	60-80	50-75	25-70	10-55	<35	NP
	10-24	Very gravelly sandy loam, gravelly loam.	GP-GM, GM, SM	A-1, A-2, A-4	0	40-80	30-75	20-70	10-55	<30	NP
	24-65	Very gravelly sand, gravelly loamy sand, gravelly sandy loam.	GW, GM, GP, SP	A-1, A-2-4, A-3	0-10	35-75	30-75	15-55	2-30	<20	NP
31UB*:											
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
Sassafras-------	0-27	Gravelly loam----	SM, CL, ML	A-1, A-2, A-4	0-10	60-85	50-75	30-70	15-55	<32	NP-10
	27-42	Loam, sandy clay loam, sandy loam.	SC-SM, CL, ML	A-2, A-4, A-6	0	85-100	85-100	50-95	25-75	20-33	5-15
	42-65	Gravelly sandy loam, loamy sand, sand.	SP-SM, SC, SM	A-1, A-2, A-4	0	70-100	50-100	30-90	5-50	<26	NP-8
32. Sulfaquepts											
33B*, 33C*:											
Sunnyside-------	0-10	Fine sandy loam	SM, SC	A-4, A-2	0	95-100	80-100	55-85	30-55	<22	NP-12
	10-39	Sandy clay loam, fine sandy loam, loam.	SM, SC, CL	A-2, A-4, A-6	0	95-100	80-100	55-95	30-75	<40	NP-24
	39-65	Loamy fine sand, fine sandy loam, fine sand.	SM, SC-SM	A-2, A-4	0	95-100	80-100	50-85	15-55	---	NP-5

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
33B*, 33C*:											
Christiana------	0-11	Loam------------	CL-ML, CL, SC	A-4, A-2-4	0	90-100	80-100	55-100	30-90	22-30	5-9
	11-65	Clay, silty clay, clay loam.	CL, CH	A-7	0	90-100	80-100	70-100	60-95	40-59	17-31
33UB*:											
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
Sunnyside-------	0-10	Fine sandy loam	SM, SC	A-4, A-2	0	95-100	80-100	55-85	30-55	<22	NP-12
	10-39	Sandy clay loam, fine sandy loam, loam.	SM, SC, CL	A-2, A-4, A-6	0	95-100	80-100	55-95	30-75	<40	NP-24
	39-65	Loamy fine sand, fine sandy loam, fine sand.	SM, SC-SM	A-2, A-4	0	95-100	80-100	50-85	15-55	---	NP-5
33UC*:											
Sunnyside-------	0-10	Fine sandy loam	SM, SC	A-4, A-2	0	95-100	80-100	55-85	30-55	<22	NP-12
	10-39	Sandy clay loam, fine sandy loam, loam.	SM, SC, CL	A-2, A-4, A-6	0	95-100	80-100	55-95	30-75	<40	NP-24
	39-65	Loamy fine sand, fine sandy loam, fine sand.	SM, SC-SM	A-2, A-4	0	95-100	80-100	50-85	15-55	---	NP-5
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
34UB*, 34UC*:											
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
Sunnyside-------	0-10	Fine sandy loam	SM, SC	A-4, A-2	0	95-100	80-100	55-85	30-55	<22	NP-12
	10-39	Sandy clay loam, fine sandy loam, loam.	SM, SC, CL	A-2, A-4, A-6	0	95-100	80-100	55-95	30-75	<40	NP-24
	39-65	Loamy fine sand, fine sandy loam, fine sand.	SM, SC-SM	A-2, A-4	0	95-100	80-100	50-85	15-55	---	NP-5
Christiana------	0-11	Loam------------	CL-ML, CL, SC	A-4, A-2-4	0	90-100	80-100	55-100	30-90	22-30	5-9
	11-65	Clay, silty clay, clay loam.	CL, CH	A-7	0	90-100	80-100	70-100	60-95	40-59	17-31
35B, 35C---------	0-10	Fine sandy loam	SM, SC	A-4, A-2	0	95-100	80-100	55-85	30-55	<22	NP-12
Sunnyside	10-39	Sandy clay loam, fine sandy loam, loam.	SM, SC, CL	A-2, A-4, A-6	0	95-100	80-100	55-95	30-75	<40	NP-24
	39-65	Loamy fine sand, fine sandy loam, fine sand.	SM, SC-SM	A-2, A-4	0	95-100	80-100	50-85	15-55	---	NP-5

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
36UB*:											
Sunnyside-------	0-10	Fine sandy loam	SM, SC	A-4, A-2	0	95-100	80-100	55-85	30-55	<22	NP-12
	10-39	Sandy clay loam, fine sandy loam, loam.	SM, SC, CL	A-2, A-4, A-6	0	95-100	80-100	55-95	30-75	<40	NP-24
	39-65	Loamy fine sand, fine sandy loam, fine sand.	SM, SC-SM	A-2, A-4	0	95-100	80-100	50-85	15-55	---	NP-5
Urban land------	0-60	Variable---------	---	---	---	---	---	---	---	---	---
37. Sulfaquepts											
38C--------------	0-2	Clay loam--------	CL	A-6	0-5	90-100	80-100	80-100	60-90	25-35	10-15
Udorthents	2-65	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	90-100	85-100	75-100	65-95	40-55	15-30
39B--------------	0-3	Loam-------------	ML, CL-ML, CL	A-4	0-5	85-100	80-100	70-95	50-75	25-35	5-10
Udorthents	3-40	Loam, silt loam, clay loam.	ML	A-6, A-7-6	0-5	90-100	80-100	70-100	55-95	35-45	10-15
	40-65	Weathered bedrock	---	---	---	---	---	---	---	---	---
39C. Udorthents											
39E--------------	0-3	Loam-------------	ML, CL-ML, CL	A-4	0-5	85-100	80-100	70-95	50-75	25-35	5-10
Udorthents	3-40	Loam, silt loam, clay loam.	ML	A-6, A-7-6	0-5	90-100	80-100	70-100	55-95	35-45	10-15
	40-65	Weathered bedrock	---	---	---	---	---	---	---	---	---
40B, 40C, 40E----	0-2	Sandy loam-------	SM, SC-SM, ML	A-2, A-4	0-5	85-100	80-100	50-85	25-55	15-25	NP-5
Udorthents	2-65	Sandy loam, loam	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	70-95	50-75	15-30	5-15
41E--------------	0-2	Gravelly sandy loam.	GC, SC	A-2, A-6	0-5	50-80	45-75	25-60	15-40	35-37	13-15
Udorthents	2-65	Very gravelly sandy loam, very gravelly loamy sand, very gravelly sand.	GW, GP, GC, SP	A-1, A-2-4, A-2-6	5-15	40-60	30-55	15-40	0-20	20-38	5-15
42*:											
Udorthents------	0-5	Gravelly loam----	SM, CL, ML, SC	A-2, A-4	0-5	75-100	60-75	40-70	20-55	<32	NP-10
	5-65	Stratified gravelly sandy loam to silt loam.	ML, SM, GM, GP	A-1, A-2, A-3, A-4	0-15	25-100	20-100	10-90	2-80	<35	NP-10

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
42*:											
Fluvents	0-5	Sandy loam	ML, CL-ML, GM, SM	A-4	0-5	75-100	60-100	50-80	35-60	10-20	NP-5
	5-25	Sandy loam, silt loam, gravelly loam.	ML, CL-ML, GM, SM	A-4	0-10	75-100	60-100	50-90	35-80	10-25	NP-6
	25-65	Stratified sandy loam to gravelly loam.	SM, ML, SP-SM	A-2, A-4, A-3	---	90-100	70-90	50-95	5-60	<30	2-15
42E	0-5	Gravelly sandy loam.	GC, SC	A-2, A-6	0-5	50-80	45-75	25-60	15-40	35-37	13-15
Udorthents	5-65	Stratified sand to loam.	SM, ML, SP-SM	A-2, A-4, A-3, A-6	0	90-100	90-100	60-95	5-60	15-30	NP-15
43U*:											
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
Udorthents	0-2	Sandy loam	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	70-95	50-75	20-33	5-15
	2-65	Stratified gravelly sandy loam to silt loam.	ML, SM, GM, GP	A-1, A-2, A-3, A-4	0-15	25-100	20-100	10-90	2-80	<35	NP-10
44UC*	0-60	Variable	---	---	---	---	---	---	---	---	---
Urban land											
45UB*:											
Woodstown	0-22	Sandy loam	SM, SC-SM	A-2, A-4	0	95-100	90-100	55-70	30-40	<25	NP-6
	22-41	Sandy loam, sandy clay loam.	SC, SC-SM, CL	A-4, A-6	0	95-100	90-100	55-90	35-55	<30	NP-15
	41-65	Sandy clay	SC, CL	A-6, A-7	0	95-100	90-100	80-90	35-55	30-50	10-30
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
46UB*:											
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---
Woodstown	0-22	Sandy loam	SM, SC-SM	A-2, A-4	0	95-100	90-100	55-70	30-40	<25	NP-6
	22-41	Sandy loam, sandy clay loam.	SC, SC-SM, CL	A-4, A-6	0	95-100	90-100	55-90	35-55	<30	NP-15
	41-65	Sandy clay	SC, CL	A-6, A-7	0	95-100	90-100	80-90	35-55	30-50	10-30

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
1UB*:												
Baile	0-18	15-32	1.20-1.40	0.2-0.6	0.16-0.25	3.6-5.5	<2	Low	0.43	5	5	1-4
	18-35	10-35	1.30-1.60	0.06-0.2	0.12-0.24	3.6-5.5	<2	Moderate	0.43			
	35-65	10-25	1.30-1.60	0.06-0.6	0.10-0.24	3.6-5.5	<2	Low	0.43			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
2B*:												
Beltsville	0-12	7-20	1.20-1.40	0.6-2.0	0.18-0.21	3.6-5.5	<2	Low	0.43	3	5	1-3
	12-20	20-30	1.30-1.50	0.6-2.0	0.18-0.21	3.6-5.5	<2	Low	0.43			
	20-45	20-30	1.60-1.90	<0.2	0.05-0.10	3.6-5.5	<2	Low	0.32			
	45-65	20-35	1.30-1.50	0.2-6.0	0.08-0.18	3.6-5.5	<2	Low	0.37			
Keyport	0-4	10-25	1.20-1.60	0.2-2.0	0.16-0.22	3.6-5.5	<2	Low	0.43	3-2	5	1-3
	4-48	30-50	1.35-1.60	<0.2	0.14-0.20	4.5-5.5	<2	Moderate	0.32			
	48-65	5-50	1.35-1.75	0.06-20	0.07-0.20	3.6-5.5	<2	Low	0.28			
2UB*, 2UC*:												
Beltsville	0-12	7-20	1.20-1.40	0.6-2.0	0.18-0.21	3.6-5.5	<2	Low	0.43	3	5	1-3
	12-20	20-30	1.30-1.50	0.6-2.0	0.18-0.21	3.6-5.5	<2	Low	0.43			
	20-45	20-30	1.60-1.90	<0.2	0.05-0.10	3.6-5.5	<2	Low	0.32			
	45-65	20-35	1.30-1.50	0.2-6.0	0.08-0.18	3.6-5.5	<2	Low	0.37			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
3UB*:												
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
Beltsville	0-12	7-20	1.20-1.40	0.6-2.0	0.18-0.21	3.6-5.5	<2	Low	0.43	3	5	1-3
	12-20	20-30	1.30-1.50	0.6-2.0	0.18-0.21	3.6-5.5	<2	Low	0.43			
	20-45	20-30	1.60-1.90	<0.2	0.05-0.10	3.6-5.5	<2	Low	0.32			
	45-65	20-35	1.30-1.50	0.2-6.0	0.08-0.18	3.6-5.5	<2	Low	0.37			
Keyport	0-4	10-25	1.20-1.60	0.2-2.0	0.16-0.22	3.6-5.5	<2	Low	0.43	3-2	5	1-3
	4-48	30-50	1.35-1.60	<0.2	0.14-0.20	4.5-5.5	<2	Moderate	0.32			
	48-65	5-50	1.35-1.75	0.06-20	0.07-0.20	3.6-5.5	<2	Low	0.28			
4UB*:												
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
Beltsville	0-12	7-20	1.20-1.40	0.6-2.0	0.18-0.21	3.6-5.5	<2	Low	0.43	3	5	1-3
	12-20	20-30	1.30-1.50	0.6-2.0	0.18-0.21	3.6-5.5	<2	Low	0.43			
	20-45	20-30	1.60-1.90	<0.2	0.05-0.10	3.6-5.5	<2	Low	0.32			
	45-65	20-35	1.30-1.50	0.2-6.0	0.08-0.18	3.6-5.5	<2	Low	0.37			
5E	0-6	7-18	1.20-1.40	2.0-6.0	0.14-0.16	3.6-5.5	<2	Low	0.24	2	5	1-3
Brandywine	6-19	7-18	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	<2	Low	0.20			
	19-25	2-7	1.30-1.50	2.0-20.0	0.04-0.08	3.6-5.5	<2	Low	0.15			
	25-65	2-7	1.30-1.50	2.0-20.0	0.04-0.08	3.6-5.5	<2	Low	0.15			
6B	0-8	10-23	1.10-1.30	0.6-2.0	0.12-0.16	4.5-5.5	<2	Low	0.32	5	5	1-3
Chester	8-38	18-35	1.20-1.50	0.6-2.0	0.10-0.14	4.5-5.5	<2	Low	0.43			
	38-65	10-24	1.40-1.60	0.6-2.0	0.08-0.12	4.5-5.5	<2	Low	0.49			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
6UB*:												
Chester	0-8	10-23	1.10-1.30	0.6-2.0	0.12-0.16	4.5-5.5	<2	Low	0.32	5	5	1-3
	8-38	18-35	1.20-1.50	0.6-2.0	0.10-0.14	4.5-5.5	<2	Low	0.43			
	38-65	10-24	1.40-1.60	0.6-2.0	0.08-0.12	4.5-5.5	<2	Low	0.49			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
7UB*, 7UC*:												
Christiana	0-11	10-26	1.25-1.50	0.2-2.0	0.18-0.24	3.6-5.0	<2	Low	0.43	5	5	1-2
	11-65	28-75	1.30-1.40	0.06-0.6	0.14-0.20	3.6-5.0	<2	Moderate	0.28			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
8UB*:												
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
Christiana	0-11	10-26	1.25-1.50	0.2-2.0	0.18-0.24	3.6-5.0	<2	Low	0.43	5	5	1-2
	11-65	28-75	1.30-1.40	0.06-0.6	0.14-0.20	3.6-5.0	<2	Moderate	0.28			
9UB*:												
Elkton	0-5	11-25	1.20-1.50	0.6-2.0	0.18-0.24	3.6-5.5	<2	Low	0.43	4	5	1-4
	5-14	27-35	1.35-1.55	0.06-0.2	0.14-0.20	3.6-5.5	<2	Moderate	0.37			
	14-65	27-45	1.35-1.55	<0.2	0.12-0.19	3.6-5.5	<2	Moderate	0.32			
	65-70	15-20	1.45-1.65	0.2-0.6	0.10-0.15	3.6-5.5	<2	Low	0.32			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
10	0-5	5-15	1.00-1.40	0.6-2.0	0.10-0.15	3.6-7.3	<2	Low	0.43	5	3	.5-2
Fluvents	5-25	5-20	1.00-1.45	0.6-6.0	0.06-0.12	3.6-7.3	<2	Low	0.37			
	25-65	3-20	1.20-1.50	2.0-20	0.05-0.18	4.5-6.5	---	Low	0.20			
11B	0-7	4-10	1.50-1.70	6.0-20	0.06-0.08	3.6-5.5	<2	Low	0.17	5	2	.5-2
Galestown	7-50	4-10	1.50-1.70	>6.0	0.04-0.08	3.6-5.5	<2	Low	0.17			
	50-65	2-6	1.50-1.65	>6.0	0.04-0.08	3.6-5.5	<2	Low	0.17			
11UB*:												
Galestown	0-7	4-10	1.50-1.70	6.0-20	0.06-0.08	3.6-5.5	<2	Low	0.17	5	2	.5-2
	7-50	4-10	1.50-1.70	>6.0	0.04-0.08	3.6-5.5	<2	Low	0.17			
	50-65	2-6	1.50-1.65	>6.0	0.04-0.08	3.6-5.5	<2	Low	0.17			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
12A, 12B	0-8	15-27	1.00-1.30	0.6-2.0	0.16-0.22	4.5-6.0	<2	Low	0.32	3	6	.5-2
Jackland	8-41	40-60	1.20-1.50	<0.06	0.08-0.12	4.5-7.8	<2	Very high	0.10			
	41-65	10-40	1.30-1.60	0.6-2.0	0.10-0.14	4.5-7.8	<2	Low	0.15			
12UB*:												
Jackland	0-8	15-27	1.00-1.30	0.6-2.0	0.16-0.22	4.5-6.0	<2	Low	0.32	3	6	.5-2
	8-41	40-60	1.20-1.50	<0.06	0.08-0.12	4.5-7.8	<2	Very high	0.10			
	41-65	10-40	1.30-1.60	0.6-2.0	0.10-0.14	4.5-7.8	<2	Low	0.15			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
13B, 13C, 13E	0-10	5-18	1.20-1.45	2.0-6.0	0.12-0.18	3.6-5.5	<2	Low	0.28	3	3	1-4
Joppa	10-24	10-25	1.35-1.65	2.0-20	0.06-0.10	3.6-5.5	<2	Low	0.28			
	24-65	2-15	1.60-1.75	2.0-20	0.02-0.10	3.6-5.5	<2	Low	0.28			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
13UB*, 13UC*:												
Joppa	0-10	5-18	1.20-1.45	2.0-6.0	0.12-0.18	3.6-5.5	<2	Low	0.28	3	3	1-4
	10-24	10-25	1.35-1.65	2.0-20	0.06-0.10	3.6-5.5	<2	Low	0.28			
	24-65	2-15	1.60-1.75	2.0-20	0.02-0.10	3.6-5.5	<2	Low	0.28			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
14UB*:												
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
Joppa	0-10	5-18	1.20-1.45	2.0-6.0	0.12-0.18	3.6-5.5	<2	Low	0.28	3	3	1-4
	10-24	10-25	1.35-1.65	2.0-20	0.06-0.10	3.6-5.5	<2	Low	0.28			
	24-65	2-15	1.60-1.75	2.0-20	0.02-0.10	3.6-5.5	<2	Low	0.28			
15B	0-4	10-25	1.20-1.60	0.2-2.0	0.16-0.22	3.6-5.5	<2	Low	0.43	3-2	5	1-3
Keyport	4-48	30-50	1.35-1.60	<0.2	0.14-0.20	4.5-5.5	<2	Moderate	0.32			
	48-65	5-50	1.35-1.75	0.06-20	0.07-0.20	3.6-5.5	<2	Low	0.28			
15UB*:												
Keyport	0-4	10-25	1.20-1.60	0.2-2.0	0.16-0.22	3.6-5.5	<2	Low	0.43	3-2	5	1-3
	4-48	30-50	1.35-1.60	<0.2	0.14-0.20	4.5-5.5	<2	Moderate	0.32			
	48-65	5-50	1.35-1.75	0.06-20	0.07-0.20	3.6-5.5	<2	Low	0.28			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
16UB*:												
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
Keyport	0-4	10-25	1.20-1.60	0.2-2.0	0.16-0.22	3.6-5.5	<2	Low	0.43	3-2	5	1-3
	4-48	30-50	1.35-1.60	<0.2	0.14-0.20	4.5-5.5	<2	Moderate	0.32			
	48-65	5-50	1.35-1.75	0.06-20	0.07-0.20	3.6-5.5	<2	Low	0.28			
17B, 17C, 17E	0-12	12-34	1.20-1.40	0.6-6.0	0.12-0.24	5.1-6.0	<2	Low	0.32	5	6	1-3
Legore	12-22	27-34	1.40-1.60	0.6-2.0	0.12-0.24	5.6-6.5	<2	Moderate	0.17			
	22-65	18-34	1.40-1.60	0.6-6.0	0.08-0.12	5.6-6.5	<2	Low	0.28			
18B, 18C, 18E	0-9	12-34	1.20-1.40	0.6-6.0	0.10-0.24	5.1-6.0	<2	Low	0.32	5	6	1-3
Legore	9-32	27-34	1.40-1.60	0.6-2.0	0.12-0.24	5.6-6.5	<2	Moderate	0.17			
	32-65	18-34	1.40-1.60	0.6-6.0	0.08-0.12	5.6-6.5	<2	Low	0.28			
18UB*, 18UC*, 18UE*:												
Legore	0-12	12-34	1.20-1.40	0.6-6.0	0.12-0.24	5.1-6.0	<2	Low	0.32	5	6	1-3
	12-22	27-34	1.40-1.60	0.6-2.0	0.12-0.24	5.6-6.5	<2	Moderate	0.17			
	22-65	18-34	1.40-1.60	0.6-6.0	0.08-0.12	5.6-6.5	<2	Low	0.28			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
19UB*, 19UC*:												
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
Legore	0-12	12-34	1.20-1.40	0.6-6.0	0.12-0.24	5.1-6.0	<2	Low	0.32	5	6	1-3
	12-22	27-34	1.40-1.60	0.6-2.0	0.12-0.24	5.6-6.5	<2	Moderate	0.17			
	22-65	18-34	1.40-1.60	0.6-6.0	0.08-0.12	5.6-6.5	<2	Low	0.28			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
20B----------	0-15	8-22	1.40-1.70	0.6-2.0	0.18-0.24	3.6-5.5	<2	Low-------	0.43	3	5	.5-6
Leonardtown	15-50	15-35	1.70-1.90	<0.2	0.08-0.12	3.6-5.5	<2	Low-------	0.32			
	50-65	10-30	1.60-1.90	0.2-6.0	0.08-0.18	3.6-5.5	<2	Low-------	0.37			
20UB*:												
Leonardtown-----	0-15	8-22	1.40-1.70	0.6-2.0	0.18-0.24	3.6-5.5	<2	Low-------	0.43	3	5	.5-6
	15-50	15-35	1.70-1.90	<0.2	0.08-0.12	3.6-5.5	<2	Low-------	0.32			
	50-65	10-30	1.60-1.90	0.2-6.0	0.08-0.18	3.6-5.5	<2	Low-------	0.37			
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
21C, 21E---------	0-7	10-25	1.10-1.40	0.6-2.0	0.17-0.21	3.6-6.0	<2	Low-------	0.37	5	6	1-3
Manor	7-35	10-25	1.20-1.50	0.6-2.0	0.14-0.20	3.6-6.0	<2	Low-------	0.32			
	35-65	5-20	1.25-1.50	0.6-6.0	0.10-0.20	3.6-6.0	<2	Low-------	0.49			
22UB*, 22UC*:												
Manor-----------	0-7	10-25	1.10-1.40	0.6-2.0	0.17-0.21	3.6-6.0	<2	Low-------	0.37	5	6	1-3
	7-35	10-25	1.20-1.50	0.6-2.0	0.14-0.20	3.6-6.0	<2	Low-------	0.32			
	35-65	5-20	1.25-1.50	0.6-6.0	0.10-0.20	3.6-6.0	<2	Low-------	0.49			
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
23UB*:												
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
Manor-----------	0-7	10-25	1.10-1.40	0.6-2.0	0.17-0.21	3.6-6.0	<2	Low-------	0.37	5	6	1-3
	7-35	10-25	1.20-1.50	0.6-2.0	0.14-0.20	3.6-6.0	<2	Low-------	0.32			
	35-65	5-20	1.25-1.50	0.6-6.0	0.10-0.20	3.6-6.0	<2	Low-------	0.49			
24UB*:												
Matapeake-------	0-15	5-15	1.10-1.45	0.6-2.0	0.15-0.24	4.5-5.5	<2	Low-------	0.43	4	5	1-2
	15-65	18-30	1.40-1.65	0.2-2.0	0.18-0.24	3.6-5.5	<2	Low-------	0.43			
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
25B----------	0-12	10-18	1.10-1.45	0.6-2.0	0.20-0.28	3.6-5.5	<2	Low-------	0.43	4	5	.5-3
Mattapex	12-41	18-30	1.25-1.45	0.2-2.0	0.18-0.22	3.6-5.5	<2	Low-------	0.43			
	41-65	8-15	1.45-1.65	0.6-6.0	0.14-0.18	3.6-5.5	<2	Low-------	0.28			
25UB*:												
Mattapex--------	0-12	10-18	1.10-1.45	0.6-2.0	0.20-0.28	3.6-5.5	<2	Low-------	0.43	4	5	.5-3
	12-41	18-30	1.25-1.45	0.2-2.0	0.18-0.22	3.6-5.5	<2	Low-------	0.43			
	41-65	8-15	1.45-1.65	0.6-6.0	0.14-0.18	3.6-5.5	<2	Low-------	0.28			
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
26B----------	0-18	18-35	1.40-1.70	0.6-6.0	0.12-0.16	4.5-6.5	<2	Low-------	0.32	5	6	1-3
Montalto	18-32	30-55	1.35-1.65	0.2-0.6	0.08-0.16	5.1-6.5	<2	High------	0.28			
	32-65	20-40	1.60-1.80	0.6-2.0	0.14-0.21	5.1-6.5	<2	Moderate	0.28			
26C----------	0-6	18-27	1.40-1.70	0.6-6.0	0.12-0.16	4.5-6.5	<2	Low-------	0.32	5	6	1-3
Montalto	6-18	18-35	1.40-1.70	0.6-6.0	0.12-0.16	5.1-6.5	<2	Moderate	0.28			
	18-32	30-55	1.30-1.60	0.2-0.6	0.08-0.16	5.1-6.5	<2	High------	0.28			
	32-65	20-40	1.60-1.80	0.6-2.0	0.14-0.21	5.1-6.5	<2	Moderate	0.28			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
26UB*, 26UC*:												
Montalto--------	0-18	18-35	1.40-1.70	0.6-6.0	0.12-0.16	4.5-6.5	<2	Low-------	0.32	5	6	1-3
	18-32	30-55	1.35-1.65	0.2-0.6	0.08-0.16	5.1-6.5	<2	High------	0.28			
	32-65	20-40	1.60-1.80	0.6-2.0	0.14-0.21	5.1-6.5	<2	Moderate	0.28			
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
27UB*:												
Urban land------	0-65	---	---	---	---	---	<2	----------	----	---	---	---
Montalto--------	0-18	18-35	1.40-1.70	0.6-6.0	0.12-0.16	4.5-6.5	<2	Low-------	0.32	5	6	1-3
	18-32	30-55	1.35-1.65	0.2-0.6	0.08-0.16	5.1-6.5	<2	High------	0.28			
	32-65	20-40	1.60-1.80	0.6-2.0	0.14-0.21	5.1-6.5	<2	Moderate	0.28			
28B, 28C, 28E----	0-15	10-30	1.10-1.30	0.6-2.0	0.18-0.24	4.5-6.0	<2	Low-------	0.24	3	5	1-6
Relay	15-65	10-25	1.40-1.60	0.6-2.0	0.16-0.20	6.1-7.3	<2	Low-------	0.32			
28UB*, 28UC*, 28UE*:												
Relay----------	0-30	10-30	1.10-1.30	0.6-2.0	0.18-0.24	4.5-6.0	<2	Low-------	0.24	3	6	1-6
	30-65	10-25	1.40-1.60	0.6-2.0	0.16-0.20	6.1-7.3	<2	Low-------	0.32			
Urban land-----	0-60	---	---	---	---	---	<2	----------	----	---	---	---
29B, 29C---------	0-27	3-12	1.00-1.40	0.6-6.0	0.10-0.14	3.6-5.5	<2	Low-------	0.20	5	3	1-2
	27-42	18-27	1.35-1.50	0.6-2.0	0.11-0.22	3.6-5.5	<2	Low-------	0.37			
Sassafras	35-65	3-12	1.35-1.50	0.6-20	0.04-0.12	3.6-5.5	<2	Low-------	0.17			
29UB*, 29UC*:												
Sassafras-------	0-27	3-12	1.00-1.40	0.6-6.0	0.10-0.14	3.6-5.5	<2	Low-------	0.20	5	3	1-2
	27-42	18-27	1.35-1.50	0.6-2.0	0.11-0.22	3.6-5.5	<2	Low	0.37			
	42-65	3-12	1.35-1.50	0.6-20	0.04-0.12	3.6-5.5	<2	Low-------	0.17			
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
30B*:												
Sassafras-------	0-27	3-12	1.00-1.40	0.6-6.0	0.10-0.14	3.6-5.5	<2	Low-------	0.20	5	3	1-2
	27-42	18-27	1.35-1.50	0.6-2.0	0.11-0.22	3.6-5.5	<2	Low	0.37			
	42-65	3-12	1.35-1.50	0.6-20	0.04-0.12	3.6-5.5	<2	Low-------	0.17			
Joppa-----------	0-10	5-18	1.20-1.45	2.0-6.0	0.12-0.18	3.6-5.5	<2	Low-------	0.28	3	3	1-4
	10-24	10-25	1.35-1.65	2.0-20	0.06-0.10	3.6-5.5	<2	Low-------	0.28			
	24-65	2-15	1.60-1.75	2.0-20	0.02-0.10	3.6-5.5	<2	Low-------	0.28			
31UB*:												
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
Sassafras-------	0-27	3-12	1.00-1.40	0.6-6.0	0.10-0.14	3.6-5.5	<2	Low-------	0.20	5	3	1-2
	27-42	18-27	1.35-1.50	0.6-2.0	0.11-0.22	3.6-5.5	<2	Low	0.37			
	42-65	3-12	1.35-1.50	0.6-20	0.04-0.12	3.6-5.5	<2	Low-------	0.17			
32. Sulfaquepts												

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
33B*, 33C*:												
Sunnyside	0-10	5-15	1.10-1.25	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24	5	3	1-4
	10-39	15-29	1.35-1.55	0.6-2.0	0.12-0.20	3.6-5.0	<2	Low	0.28			
	39-65	5-20	1.35-1.55	2.0-6.0	0.08-0.18	3.6-4.4	<2	Low	0.24			
Christiana	0-11	10-26	1.25-1.50	0.2-2.0	0.18-0.24	3.6-5.0	<2	Low	0.43	5	5	1-2
	11-65	28-75	1.30-1.40	0.06-0.6	0.14-0.20	3.6-5.0	<2	Moderate	0.28			
33UB*:												
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
Sunnyside	0-10	5-15	1.10-1.25	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24	5	3	1-4
	10-39	15-29	1.35-1.55	0.6-2.0	0.12-0.20	3.6-5.0	<2	Low	0.28			
	39-65	5-20	1.35-1.55	2.0-6.0	0.08-0.18	3.6-4.4	<2	Low	0.24			
33UC*:												
Sunnyside	0-10	5-15	1.10-1.25	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24	5	3	1-4
	10-39	15-29	1.35-1.55	0.6-2.0	0.12-0.20	3.6-5.0	<2	Low	0.28			
	39-65	5-20	1.35-1.55	2.0-6.0	0.08-0.18	3.6-4.4	<2	Low	0.24			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
34UB*, 34UC*:												
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
Sunnyside	0-10	5-15	1.10-1.25	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24	5	3	1-4
	10-39	15-29	1.35-1.55	0.6-2.0	0.12-0.20	3.6-5.0	<2	Low	0.28			
	39-65	5-20	1.35-1.55	2.0-6.0	0.08-0.18	3.6-4.4	<2	Low	0.24			
Christiana	0-11	10-26	1.25-1.50	0.2-2.0	0.18-0.24	3.6-5.0	<2	Low	0.43	5	5	1-2
	11-65	28-75	1.30-1.40	0.06-0.6	0.14-0.20	3.6-5.0	<2	Moderate	0.28			
35B, 35C	0-10	5-15	1.10-1.25	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24	5	3	1-4
Sunnyside	10-39	15-29	1.35-1.55	0.6-2.0	0.12-0.20	3.6-5.0	<2	Low	0.28			
	39-65	5-20	1.35-1.55	2.0-6.0	0.08-0.18	3.6-4.4	<2	Low	0.24			
36UB*:												
Sunnyside	0-10	5-15	1.10-1.25	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24	5	3	1-4
	10-39	15-29	1.35-1.55	0.6-2.0	0.12-0.20	3.6-5.0	<2	Low	0.28			
	39-65	5-20	1.35-1.55	2.0-6.0	0.08-0.18	3.6-4.4	<2	Low	0.24			
Urban land	0-60	---	---	---	---	---	<2	---	---	---	---	---
37. Sulfaquepts												
38C	0-2	27-35	1.35-1.60	0.2-0.6	0.14-0.20	5.1-6.5	<2	Moderate	0.32	3	4	1-2
Udorthents	2-65	35-50	1.35-1.60	0.06-0.2	0.14-0.20	5.1-6.5	<2	Moderate	0.28			
39B	0-3	15-25	1.00-1.45	0.06-0.6	0.14-0.18	5.1-6.5	<2	Low	0.28	5	5	1-2
Udorthents	3-40	25-35	1.30-1.60	0.06-0.2	0.14-0.20	5.1-6.5	<2	Moderate	0.37			
	40-65	---	---	---	---	---	---	---	---			
39C. Udorthents												

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
39E----------	0-3	15-25	1.00-1.45	0.06-0.6	0.14-0.18	5.1-6.5	<2	Low-------	0.28	5	5	1-2
Udorthents	3-40	25-35	1.30-1.60	0.06-0.2	0.14-0.20	5.1-6.5	<2	Moderate	0.37			
	40-65	---	---	---	---	---	---	----------	----			
40B, 40C, 40E----	0-2	6-15	---	0.06-0.6	0.10-0.13	4.5-5.0	<2	Low-------	0.28	5	3	1-2
Udorthents	2-65	8-20	---	0.06-0.6	0.12-0.15	4.5-5.0	<2	Moderate	0.28			
41E----------	0-2	15-20	1.40-1.65	2.0-6.0	0.06-0.16	3.6-5.5	<2	Low-------	0.20	5	3	0-1
Udorthents	2-65	5-20	1.40-1.65	6.0-20	0.01-0.10	3.6-5.5	<2	Low-------	0.17			
42*:												
Udorthents------	0-5	3-15	1.40-1.65	0.6-6.0	0.10-0.12	4.5-5.0	<2	Low-------	0.28	5	5	0-2
	5-65	10-15	1.00-2.00	>0.06	0.01-0.20	4.5-5.0	<2	Low-------	0.17			
Fluvents--------	0-5	5-15	1.00-1.40	0.6-2.0	0.10-0.15	3.6-7.3	<2	Low-------	0.43	5	3	.5-2
	5-25	5-20	1.00-1.45	0.6-6.0	0.06-0.12	3.6-7.3	<2	Low-------	0.37			
	25-65	3-20	1.20-1.50	2.0-20	0.05-0.18	4.5-6.5	---	Low-------	0.20			
42E----------	0-5	15-20	1.40-1.65	2.0-6.0	0.06-0.16	3.6-5.5	<2	Low-------	0.20	5	3	0-1
Udorthents	5-65	3-20	1.55-1.80	2.0-20	0.05-0.20	3.6-5.5	<2	Low-------	0.15			
43U*:												
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
Udorthents------	0-2	8-20	1.40-1.65	0.6-2.0	0.11-0.22	4.5-5.0	<2	Low-------	0.37	4	3	0-2
	2-65	10-15	1.00-2.00	>0.06	0.01-0.20	4.5-5.0	<2	Low-------	0.17			
44UC*----------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
Urban land												
45UB*:												
Woodstown-------	0-22	10-15	1.20-1.50	0.6-2.0	0.10-0.13	3.6-5.5	<2	Low-------	0.28	4	3	.5-2
	22-41	10-22	1.30-1.60	0.6-2.0	0.12-0.16	3.6-5.5	<2	Low-------	0.37			
	41-65	20-40	1.50-1.70	<0.2	0.14-0.17	3.6-5.5	<2	Moderate	0.37			
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
46UB*:												
Urban land------	0-60	---	---	---	---	---	<2	----------	----	---	---	---
Woodstown-------	0-22	10-15	1.20-1.50	0.6-2.0	0.10-0.13	3.6-5.5	<2	Low-------	0.28	4	3	.5-2
	22-41	10-22	1.30-1.60	0.6-2.0	0.12-0.16	3.6-5.5	<2	Low-------	0.37			
	41-65	20-40	1.50-1.70	<0.2	0.14-0.17	3.6-5.5	<2	Moderate	0.37			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "very brief," "apparent," and "perched" are explained the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
1UB*:							
Baile	D	None	---	---	0-0.5	Apparent	Nov-Apr
Urban land	---	None	---	---	>2.0	---	---
2B*:							
Beltsville	C	None	---	---	1.5-2.5	Perched	Nov-Apr
Keyport	C	None	---	---	1.5-4.0	Perched	Nov-May
2UB*, 2UC*:							
Beltsville	C	None	---	---	1.5-2.5	Perched	Nov-Apr
Urban land	---	None	---	---	>2.0	---	---
3UB*:							
Urban land	---	None	---	---	>2.0	---	---
Beltsville	C	None	---	---	1.5-2.5	Perched	Nov-Apr
Keyport	C	None	---	---	1.5-4.0	Perched	Nov-May
4UB*:							
Urban land	---	None	---	---	>2.0	---	---
Beltsville	C	None	---	---	1.5-2.5	Perched	Nov-Apr
5E	A	None	---	---	>6.0	---	---
Brandywine							
6B	B	None	---	---	>6.0	---	---
Chester							
6UB*:							
Chester	B	None	---	---	>6.0	---	---
Urban land	---	None	---	---	>2.0	---	---
7UB*, 7UC*:							
Christiana	C	None	---	---	>6.0	---	---
Urban land	---	None	---	---	>2.0	---	---
8UB*:							
Urban land	---	None	---	---	>2.0	---	---
Christiana	C	None	---	---	>6.0	---	---
9UB*:							
Elkton	C/D	None	---	---	0-1.0	Apparent	Nov-May
Urban land	---	None	---	---	>2.0	---	---

See footnote at end of table.

TABLE 14.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
10---------- Fluvents	B	Frequent--------	Very brief----	Sep-Jul	>3.0	Apparent	Nov-Apr
11B---------- Galestown	A	None----------	---	---	>6.0	---	---
11UB*:							
Galestown----------	A	None----------	---	---	>6.0	---	---
Urban land----------	---	None----------	---	---	>2.0	---	---
12A, 12B---------- Jackland	D	None----------	---	---	1.0-2.0	Perched	Dec-Apr
12UB*:							
Jackland----------	D	None----------	---	---	1.0-2.0	Perched	Dec-Apr
Urban land----------	---	None----------	---	---	>2.0	---	---
13B, 13C, 13E---------- Joppa	B	None----------	---	---	>6.0	---	---
13UB*, 13UC*:							
Joppa----------	B	None----------	---	---	>6.0	---	---
Urban land----------	---	None----------	---	---	>2.0	---	---
14UB*:							
Urban land----------	---	None----------	---	---	>2.0	---	---
Joppa----------	B	None----------	---	---	>6.0	---	---
15B---------- Keyport	C	None----------	---	---	1.5-4.0	Perched	Nov-May
15UB*:							
Keyport----------	C	None----------	---	---	1.5-4.0	Perched	Nov-May
Urban land----------	---	None----------	---	---	>2.0	---	---
16UB*:							
Urban land----------	---	None----------	---	---	>2.0	---	---
Keyport----------	C	None----------	---	---	1.5-4.0	Perched	Nov-May
17B, 17C, 17E, 18B, 18C, 18E---------- Legore	B	None----------	---	---	>6.0	---	---
18UB*, 18UC*, 18UE*:							
Legore----------	B	None----------	---	---	>6.0	---	---
Urban land----------	---	None----------	---	---	>2.0	---	---
19UB*, 19UC*:							
Urban land----------	---	None----------	---	---	>2.0	---	---

See footnote at end of table.

TABLE 14.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
19UB*, 19UC*: Legore	B	None	---	---	>6.0	---	---
20B Leonardtown	D	None	---	---	0-1.0	Perched	Nov-Mar
20UB*: Leonardtown	D	None	---	---	0-1.0	Perched	Nov-Mar
Urban land	---	None	---	---	>2.0	---	---
21C, 21E Manor	B	None	---	---	>6.0	---	---
22UB*, 22UC*: Manor	B	None	---	---	>6.0	---	---
Urban land	---	None	---	---	>2.0	---	---
23UB*: Urban land	---	None	---	---	>2.0	---	---
Manor	B	None	---	---	>6.0	---	---
24UB*: Matapeake	B	None	---	---	>6.0	---	---
Urban land	---	None	---	---	>2.0	---	---
25B Mattapex	C	None	---	---	1.5-3.0	Apparent	Jan-Apr
25UB*: Mattapex	C	None	---	---	1.5-3.0	Apparent	Jan-Apr
Urban land	---	None	---	---	>2.0	---	---
26B, 26C Montalto	C	None	---	---	>6.0	---	---
26UB*, 26UC*: Montalto	C	None	---	---	>6.0	---	---
Urban land	---	None	---	---	>2.0	---	---
27UB*: Urban land	---	None	---	---	>2.0	---	---
Montalto	C	None	---	---	>6.0	---	---
28B, 28C, 28E Relay	B	None	---	---	>6.0	---	---
28UB*, 28UC*, 28UE*: Relay	B	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 14.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
28UB*, 28UC*, 28UE*: Urban land	---	None	---	---	>2.0	---	---
29B, 29C Sassafras	B	None	---	---	>6.0	---	---
29UB*, 29UC*:							
Sassafras	B	None	---	---	>6.0	---	---
Urban land	---	None	---	---	>2.0	---	---
30B*:							
Sassafras	B	None	---	---	>6.0	---	---
Joppa	B	None	---	---	>6.0	---	---
31UB*:							
Urban land	---	None	---	---	>2.0	---	---
Sassafras	B	None	---	---	>6.0	---	---
32. Sulfaquepts							
33B*, 33C*:							
Sunnyside	B	None	---	---	>6.0	---	---
Christiana	C	None	---	---	>6.0	---	---
33UB*:							
Urban land	---	None	---	---	>2.0	---	---
Sunnyside	B	None	---	---	>6.0	---	---
33UC*:							
Sunnyside	B	None	---	---	>6.0	---	---
Urban land	---	None	---	---	>2.0	---	---
34UB*, 34UC*:							
Urban land	---	None	---	---	>2.0	---	---
Sunnyside	B	None	---	---	>6.0	---	---
Christiana	C	None	---	---	>6.0	---	---
35B, 35C Sunnyside	B	None	---	---	>6.0	---	---
36UB*:							
Sunnyside	B	None	---	---	>6.0	---	---
Urban land	---	None	---	---	>2.0	---	---
37. Sulfaquepts							

See footnote at end of table.

TABLE 14.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
38C---------- Udorthents	C/D	None----------	---	---	>5.0	Apparent	Nov-Mar
39B---------- Udorthents	B/C	None----------	---	---	>5.0	Apparent	Nov-Mar
39C. Udorthents							
39E, 40B, 40C, 40E------ Udorthents	B/C	None----------	---	---	>5.0	Apparent	Nov-Mar
41E---------- Udorthents	A/D	None----------	---	---	0-6.0	Apparent	Nov-May
42*: Udorthents----------	A/B	Occasional------	Very brief----	Dec-Apr	1.0-6.0	Apparent	Nov-May
Fluvents----------	B	Occasional------	Very brief----	Sep-Jul	>3.0	Apparent	Nov-Apr
42E---------- Udorthents	A/D	None----------	---	---	0-6.0	Apparent	Nov-May
43U*: Urban land----------	---	Occasional------	---	---	>2.0	---	---
Udorthents----------	A/B	Occasional------	Very brief----	Dec-Apr	1.0-6.0	Apparent	Nov-May
44UC*---------- Urban land	---	None----------	---	---	>2.0	---	---
45UB*: Woodstown----------	C	None----------	---	---	1.5-3.0	Apparent	Feb-Apr
Urban land----------	---	None----------	---	---	>2.0	---	---
46UB*: Urban land----------	---	None----------	---	---	>2.0	---	---
Woodstown----------	C	None----------	---	---	1.5-3.0	Apparent	Feb-Apr

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL FEATURES

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
1UB*:							
Baile	>60	---	---	---	High	High	High.
Urban land	>10	---	---	---	---	---	---
2B*:							
Beltsville	>60	---	---	---	High	High	High.
Keyport	>60	---	---	---	High	High	High.
2UB*, 2UC*:							
Beltsville	>60	---	---	---	High	High	High.
Urban land	>10	---	---	---	---	---	---
3UB*:							
Urban land	>10	---	---	---	---	---	---
Beltsville	>60	---	---	---	High	High	High.
Keyport	>60	---	---	---	High	High	High.
4UB*:							
Urban land	>10	---	---	---	---	---	---
Beltsville	>60	---	---	---	High	High	High.
5E	>60	---	---	---	Low	Low	High.
Brandywine							
6B	>60	---	---	---	Moderate	Low	High.
Chester							
6UB*:							
Chester	>60	---	---	---	Moderate	Low	High.
Urban land	>10	---	---	---	---	---	---
7UB*, 7UC*:							
Christiana	>60	---	---	---	Moderate	High	High.
Urban land	>10	---	---	---	---	---	---
8UB*:							
Urban land	>10	---	---	---	---	---	---
Christiana	>60	---	---	---	Moderate	High	High.
9UB*:							
Elkton	>60	---	---	---	Moderate	High	High.
Urban land	>10	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
10---------- Fluvents	>60	---	---	---	Moderate-------	High-----------	High.
11B---------- Galestown	>60	---	---	---	Low------------	Low------------	High.
11UB*: Galestown----------	>60	---	---	---	Low------------	Low------------	High.
Urban land----------	>10	---	---	---	---	---	---
12A, 12B---------- Jackland	>60	---	---	---	High-----------	High-----------	Low.
12UB*: Jackland----------	>60	---	---	---	High-----------	High-----------	Low.
Urban land----------	>10	---	---	---	---	---	---
13B, 13C, 13E---------- Joppa	>60	---	---	---	Low------------	Low------------	High.
13UB*, 13UC*: Joppa----------	>60	---	---	---	Low------------	Low------------	High.
Urban land----------	>10	---	---	---	---	---	---
14UB*: Urban land----------	>10	---	---	---	---	---	---
Joppa----------	>60	---	---	---	Low------------	Low------------	High.
15B---------- Keyport	>60	---	---	---	High-----------	High-----------	High.
15UB*: Keyport----------	>60	---	---	---	High-----------	High-----------	High.
Urban land----------	>10	---	---	---	---	---	---
16UB*: Urban land----------	>10	---	---	---	---	---	---
Keyport----------	>60	---	---	---	High-----------	High-----------	High.
17B, 17C, 17E, 18B, 18C, 18E---------- Legore	>60	---	---	---	Moderate-------	Moderate-------	Moderate.
18UB*, 18UC*, 18UE*: Legore----------	>60	---	---	---	Moderate-------	Moderate-------	Moderate.
Urban land----------	>10	---	---	---	---	---	---
19UB*, 19UC*: Urban land----------	>10	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
19UB*, 19UC*: Legore	>60	---	---	---	Moderate	Moderate	Moderate.
20B Leonardtown	>60	---	---	---	High	High	High.
20UB*: Leonardtown	>60	---	---	---	High	High	High.
Urban land	>10	---	---	---	---	---	---
21C, 21E Manor	>60	---	---	---	Moderate	Low	Moderate.
22UB*, 22UC*: Manor	>60	---	---	---	Moderate	Low	Moderate.
Urban land	>10	---	---	---	---	---	---
23UB*: Urban land	>10	---	---	---	---	---	---
Manor	>60	---	---	---	Moderate	Low	Moderate.
24UB*: Matapeake	>60	---	---	---	Moderate	Moderate	High.
Urban land	>10	---	---	---	---	---	---
25B Mattapex	>60	---	---	---	Moderate	High	High.
25UB*: Mattapex	>60	---	---	---	Moderate	High	High.
Urban land	>10	---	---	---	---	---	---
26B, 26C Montalto	>60	---	---	---	Moderate	High	High.
26UB*, 26UC*: Montalto	>60	---	---	---	Moderate	High	High.
Urban land	>10	---	---	---	---	---	---
27UB*: Urban land	>10	---	---	---	---	---	---
Montalto	>60	---	---	---	Moderate	High	High.
28B, 28C, 28E Relay	48-60	Hard	---	---	Moderate	Moderate	Moderate.
28UB*, 28UC*, 28UE*: Relay	48-60	Hard	---	---	Moderate	Moderate	Moderate.

See footnote at end of table.

TABLE 15.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
28UB*, 28UC*, 28UE*: Urban land	>10	---	---	---	---	---	---
29B, 29C---------- Sassafras	>60	---	---	---	Moderate	Low	High.
29UB*, 29UC*: Sassafras	>60	---	---	---	Moderate	Low	High.
Urban land	>10	---	---	---	---	---	---
30B*: Sassafras	>60	---	---	---	Moderate	Low	High.
30B*: Joppa	>60	---	---	---	Low	Low	High.
31UB*: Urban land	>10	---	---	---	---	---	---
Sassafras	>60	---	---	---	Moderate	Low	High.
32. Sulfaquepts							
33B*, 33C*: Sunnyside	>60	---	---	---	Moderate	Low	High.
Christiana	>60	---	---	---	Moderate	High	High.
33UB*: Urban land	>10	---	---	---	---	---	---
Sunnyside	>60	---	---	---	Moderate	Low	High.
33UC*: Sunnyside	>60	---	---	---	Moderate	Low	High.
Urban land	>10	---	---	---	---	---	---
34UB*, 34UC*: Urban land	>10	---	---	---	---	---	---
Sunnyside	>60	---	---	---	Moderate	Low	High.
Christiana	>60	---	---	---	Moderate	High	High.
35B, 35C---------- Sunnyside	>60	---	---	---	Moderate	Low	High.
36UB*: Sunnyside	>60	---	---	---	Moderate	Low	High.
Urban land	>10	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
37. Sulfaquepts							
38C---------- Udorthents	>60	---	---	---	Moderate-------	High----------	Moderate.
39B---------- Udorthents	>40	Soft	---	---	Moderate-------	Moderate-------	Moderate.
39C. Udorthents							
39E---------- Udorthents	>40	Soft	---	---	Moderate-------	Moderate-------	Moderate.
40B, 40C, 40E---------- Udorthents	>60	---	---	---	Moderate-------	Moderate-------	Moderate.
41E---------- Udorthents	>60	---	---	---	Low------------	High----------	High.
42*:							
Udorthents----------	>60	---	---	---	Moderate-------	Moderate-------	Moderate.
Fluvents----------	>60	---	---	---	Moderate-------	High----------	High.
42E---------- Udorthents	>60	---	---	---	Low------------	High----------	High.
43U*:							
Urban land----------	>10	---	---	---	---	---	---
Udorthents----------	>60	---	---	---	Moderate-------	Moderate-------	Moderate.
44UC*---------- Urban land	>10	---	---	---	---	---	---
45UB*:							
Woodstown----------	>60	---	---	---	High----------	Moderate-------	High.
Urban land----------	>10	---	---	---	---	---	---
46UB*:							
Urban land----------	>10	---	---	---	---	---	---
Woodstown----------	>60	---	---	---	High----------	Moderate-------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Baile	Fine-loamy, mixed, mesic Typic Ochraquults
Beltsville	Fine-loamy, mixed, mesic Typic Fragiudults
Brandywine	Sandy-skeletal, mixed, mesic Typic Dystrochrepts
Chester	Fine-loamy, mixed, mesic Typic Hapludults
Christiana	Clayey, kaolinitic, mesic Typic Paleudults
Elkton	Fine-silty, mixed, mesic Typic Ochraquults
Fluvents	Fluvents
Galestown	Sandy, siliceous, mesic Psammentic Hapludults
Jackland	Fine, montmorillonitic, mesic Aquic Hapludalfs
Joppa	Loamy-skeletal, siliceous, mesic Typic Hapludults
Keyport	Clayey, mixed, mesic Aquic Hapludults
Legore	Fine-loamy, mixed, mesic Ultic Hapludalfs
Leonardtown	Fine-silty, mixed, mesic Typic Fragiaquults
Manor	Coarse-loamy, micaceous, mesic Typic Dystrochrepts
*Matapeake	Fine-silty, mixed, mesic Typic Hapludults
Mattapex	Fine-silty, mixed, mesic Aquic Hapludults
Montalto	Fine, mixed, mesic Ultic Hapludalfs
Relay	Fine-loamy, mixed, mesic Typic Hapludalfs
Sassafras	Fine-loamy, siliceous, mesic Typic Hapludults
Sulfaquepts	Sulfaquepts
Sunnyside	Fine-loamy, siliceous, mesic Typic Hapludults
Woodstown	Fine-loamy, mixed, mesic Aquic Hapludults

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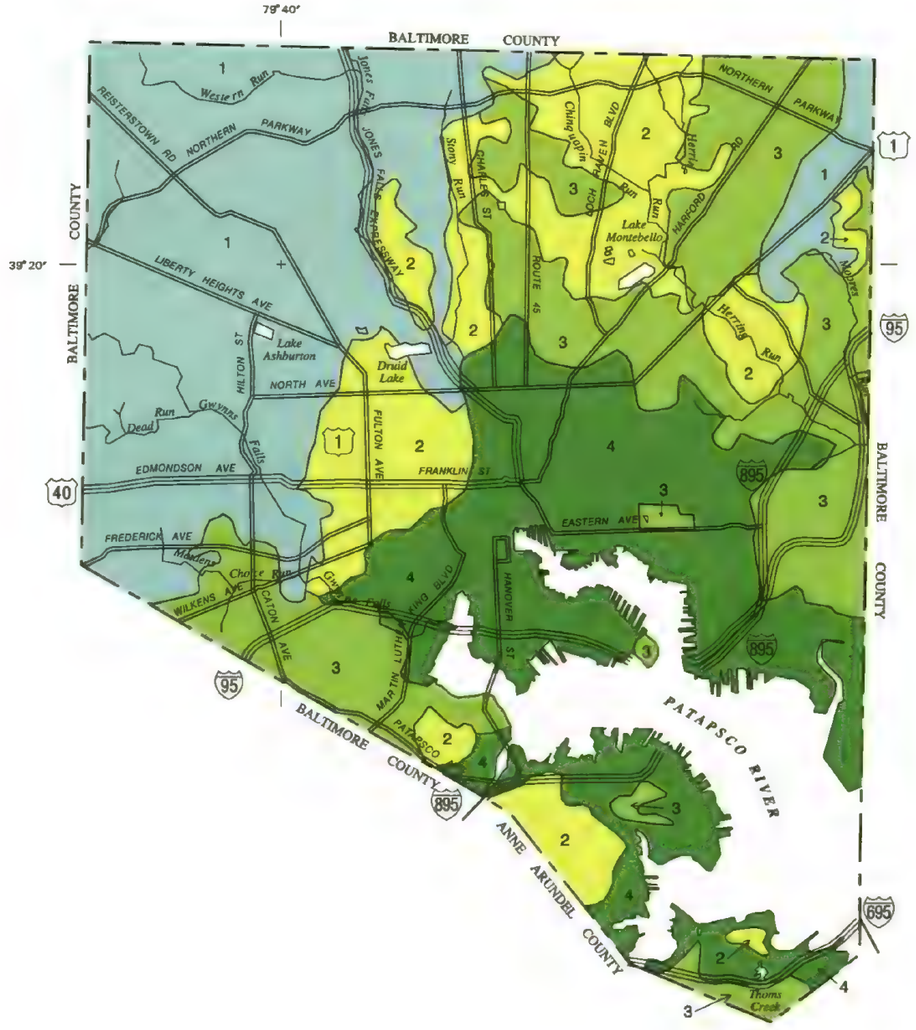


SOIL LEGEND*

1 URBAN LAND-LEGORE ASSOCIATION

2 URBAN LAND-JOPPA-SASSAFRAS ASSOCIATION

3 URBAN LAND-SUNNYSIDE ASSOCIATION

4 UDORTHENTS-URBAN LAND ASSOCIATION

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compile 1997

UNITED STATES DEPARTMENT OF AGRICULTURE
in cooperation with the
CITY OF BALITMORE, MARYLAND
and the
MARYLAND AGRICULTURAL EXPERIMENT STATION

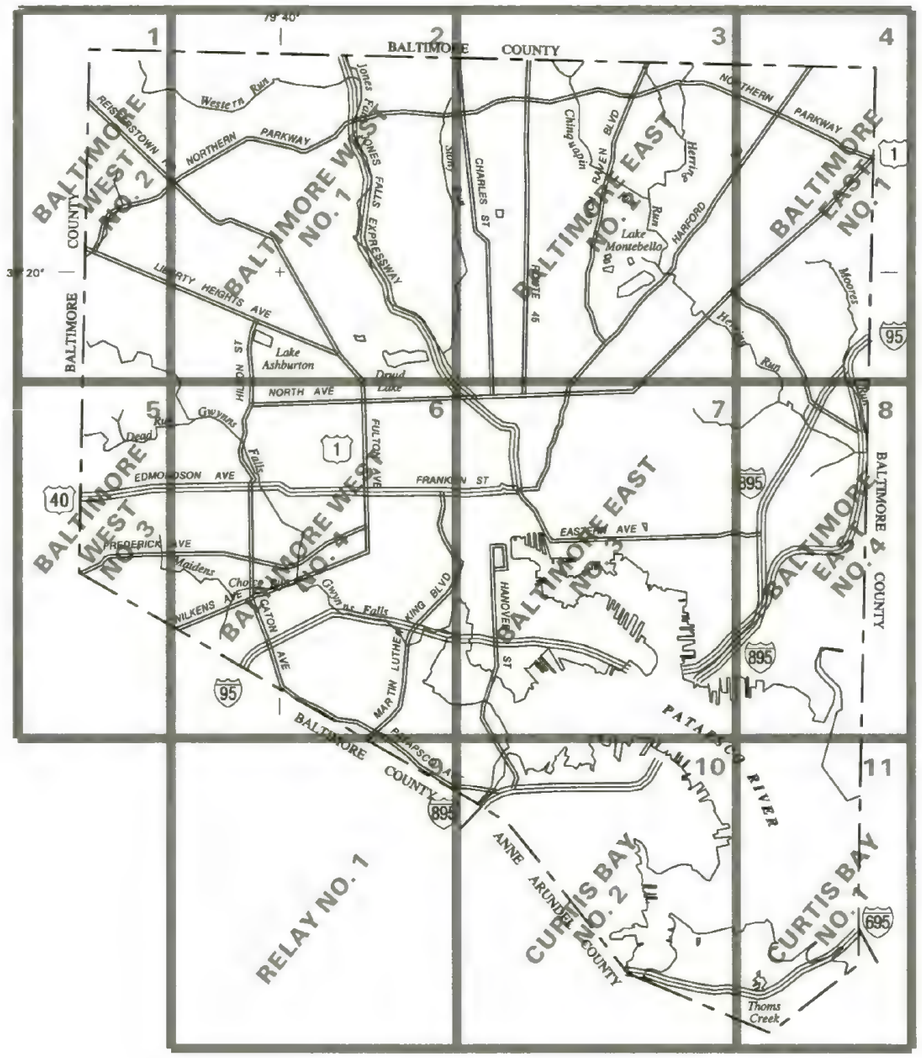
CITY OF BALTIMORE, MARYLAND

Scale 1:126720

1 0 1 2 3 MILES

1 0 1 2 3 4 5 6 KILOMETERS

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



N

INDEX TO MAP SHEETS
CITY OF BALTIMORE, MARYLAND

Scale 1:126720

1 0 1 2 3 MILES

1 0 1 2 3 4 5 6 KILOMETERS

SOIL LEGEND

Publication symbols consist of a combination of numbers and letters (e.g., 1UB, 12A). The numbers represent the soil component or components and phases in the separate map units except they do not separate slope phases. The last letter, always a capital A, B, C, D, E, or F, indicates the slope phase. The capital U is designated for Urban land in all units in which Urban is a component. All symbols without slope class are nearly level map units.

SYMBOL	NAME
1UB	Baile-Urban land complex, 0 to 8 percent slopes
2B	Beltsville-Keyport complex, 0 to 8 percent slopes
2UB	Beltsville-Urban land complex, 0 to 8 percent slopes
2UC	Beltsville-Urban land complex, 8 to 15 percent slopes
3UB	Urban land-Beltsville-Keyport complex, 0 to 8 percent slopes
4UB	Urban land-Beltsville complex, 0 to 8 percent slopes
5E	Brandywine loam, 15 to 60 percent slopes
6B	Chester loam, 0 to 8 percent slopes
6UB	Chester-Urban land complex, 0 to 8 percent slopes
7UB	Christiana-Urban land complex, 0 to 8 percent slopes
7UC	Christiana-Urban land complex, 8 to 15 percent slopes
8UB	Urban land-Chnstiana complex, 0 to 8 percent slopes
9UB	Elkton Urban land complex, 0 to 5 percent slopes
10	Fluvents, frequently flooded
11B	Galestown loamy sand, 0 to 8 percent slopes
11UB	Galestown-Urban land complex, 0 to 8 percent slopes
12A	Jackland silt loam, 0 to 3 percent slopes
12B	Jackland silt loam, 3 to 8 percent slopes
12UB	Jackland-Urban land complex, 0 to 8 percent slopes
13B	Joppa gravelly sandy loam, 0 to 8 percent slopes
13C	Joppa gravelly sandy loam, 8 to 15 percent slopes
13E	Joppa gravelly sandy loam, 15 to 60 percent slopes
13UB	Joppa-Urban land complex, 0 to 8 percent slopes
13UC	Joppa-Urban land complex, 8 to 15 percent slopes
14UB	Urban land-Joppa complex, 0 to 8 percent slopes
15B	Keyport loam, 0 to 8 percent slopes
15UB	Keyport-Urban land complex, 0 to 8 percent slopes
16UB	Urban land-Keyport complex, 0 to 8 percent slopes
17B	Legore loam, 0 to 8 percent slopes
17C	Legore loam, 8 to 15 percent slopes
17E	Legore loam, 15 to 45 percent slopes
18B	Legore loam, 0 to 8 percent slopes, stony
18C	Legore loam, 8 to 15 percent slopes, stony
18E	Legore loam, 15 to 50 percent slopes, stony
18UB	Legore-Urban land complex, 0 to 8 percent slopes
18UC	Legore-Urban land complex, 8 to 15 percent slopes
18UE	Legore-Urban land complex, 15 to 45 percent slopes
19UB	Urban land-Legore complex, 0 to 8 percent slopes
19UC	Urban land-Legore complex, 8 to 15 percent slopes
20B	Leonardtown silt loam, 0 to 8 percent slopes
20UB	Leonardtown-Urban land complex, 0 to 8 percent slopes
21C	Manor loam, 8 to 15 percent slopes
21E	Manor loam, 15 to 50 percent slopes
22UB	Manor-Urban land complex, 0 to 8 percent slopes
22UC	Manor-Urban land complex, 8 to 15 percent slopes
23UB	Urban land-Manor complex, 0 to 8 percent slopes
24UB	Matapeake-Urban land complex, 0 to 8 percent slopes
25B	Mattapex silt loam, 0 to 8 percent slopes
25UB	Mattapex-Urban land complex, 0 to 8 percent slopes
26B	Montalto silt loam, 0 to 8 percent slopes
26C	Montalto silt loam, 8 to 15 percent slopes, very stony
26UB	Montalto-Urban land complex, 0 to 8 percent slopes
26UC	Montalto-Urban land complex, 8 to 15 percent slopes
27UB	Urban land-Montalto complex, 0 to 8 percent slopes
28B	Relay silt loam, 0 to 8 percent slopes, very stony
28C	Relay silt loam, 8 to 15 percent slopes, very stony
28E	Relay silt loam, 15 to 60 percent slopes, very stony
28UB	Relay-Urban land complex, 0 to 8 percent slopes
28UC	Relay-Urban land complex, 8 to 15 percent slopes
28UE	Relay-Urban land complex, 15 to 45 percent slopes
29B	Sassafras gravelly loam, 0 to 8 percent slopes
29C	Sassafras gravelly loam, 8 to 15 percent slopes
29UB	Sassafras-Urban land complex, 0 to 8 percent slopes
29UC	Sassafras-Urban land complex, 8 to 15 percent slopes
30B	Sassafras-Joppa complex, 0 to 8 percent slopes
31UB	Urban land-Sassafras complex, 0 to 8 percent slopes
32	Sulfaquepts, dredge
33B	Sunnyside-Christiana complex, 0 to 8 percent slopes
33C	Sunnyside-Christiana complex, 8 to 15 percent slopes
33UB	Urban land-Sunnyside complex, 0 to 8 percent slopes
33UC	Sunnyside-Urban land complex, 8 to 15 percent slopes
34UB	Urban land-Sunnyside-Christiana complex, 0 to 8 percent slopes
34UC	Urban land-Sunnyside-Christiana complex, 8 to 15 percent slopes
35B	Sunnyside fine sandy loam, 0 to 8 percent slopes
35C	Sunnyside fine sandy loam, 8 to 15 percent slopes
36UB	Sunnyside-Urban land complex, 0 to 8 percent slopes
37	Sulfaquepts, frequently flooded
38C	Udorthents, clayey, very deep, 0 to 15 percent slopes
39B	Udorthents, loamy, deep, 0 to 8 percent slopes
39C	Udorthents, sanitary landfill, 0 to 15 percent slopes
39E	Udorthents, loamy, deep, 15 to 60 percent slopes
40B	Udorthents, loamy, very deep, 0 to 8 percent slopes
40C	Udorthents, loamy, very deep, 8 to 15 percent slopes
40E	Udorthents, loamy, very deep, 15 to 60 percent slopes
41E	Udorthents, gravelly, very deep, 0 to 60 percent slopes
42	Udorthents-Fluvents complex, occasionally flooded
42E	Udorthents, smoothed, 0 to 35 percent slopes
43U	Urban land-Udorthents complex, occasionally flooded
44UC	Urban land, 0 to 15 percent slopes
45UB	Woodstown-Urban land complex, 0 to 8 percent slopes
46UB	Urban land-Woodstown complex, 0 to 8 percent slopes
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (lable) and/or denied access area
- Field sheet matchline & neatline
- Previously Published Survey

OTHER BOUNDARY (label)

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate (173, 79, 340)
- Federal (287, 410, 224)
- State (62, 52, 347)
- County, farm or ranch (1283)

RAILROAD

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad
- Single side slope (showing actual feature location)

DAMS

- Medium or Small

LANDFORM FEATURES

- Prominent hil or peak
- Soil Sample Site

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Other Religion (label)
- Located object (label) (Ranger Station)
- Tank (label) (Petroleum)
- Lookout Tower
- Oil and/or Natural Gas Wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

DRAINAGE AND IRRIGATION

- Double-line canal (label) (CANAL)
- Perennial drainage and/or irrigation ditch
- Intermittent drainage and/ or irrigation ditch

SMALL LAKES, PONDS AND RESERVOIRS

- Perennial water
- Miscellaneous water
- Flood pool line (FLOOD POOL LINE)

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS (1UB, 45UB)

LANDFORM FEATURES

ESCARPMENTS

- Bedrock
- Other than bedrock

SHORT STEEP SLOPE

GULLY

DEPRESSION, closed

SINKHOLE

EXCAVATIONS

PITS

- Borrow pits
- Gravel pit
- Mine or quarry

LANDFILL

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava flow
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
BALTIMORE WEST 2 QUADRANGLE
SHEET NUMBER 1
3.75 MINUTE SERIES

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:12000

N

SHEET NUMBER 1 OF 11
CITY OF BALTIMORE, MARYLAND
BALTIMORE WEST 2 QUADRANGLE

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Digital Data: UTM Coordinate System Zone: 18
Polyconic Projection
1983 North American Datum

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
BALTIMORE WEST 1 QUADRANGLE
SHEET NUMBER 2
3.75 MINUTE SERIES

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:12000

N

SHEET NUMBER 2 OF 11
CITY OF BALTIMORE, MARYLAND
BALTIMORE WEST 1 QUADRANGLE

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Polyconic Projection
1983 North American Datum

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NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
BALTIMORE EAST 2 QUADRANGLE
SHEET NUMBER 3
3.75 MINUTE SERIES

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:12000

N

SHEET NUMBER 3 OF 11
CITY OF BALTIMORE, MARYLAND
BALTIMORE EAST 2 QUADRANGLE

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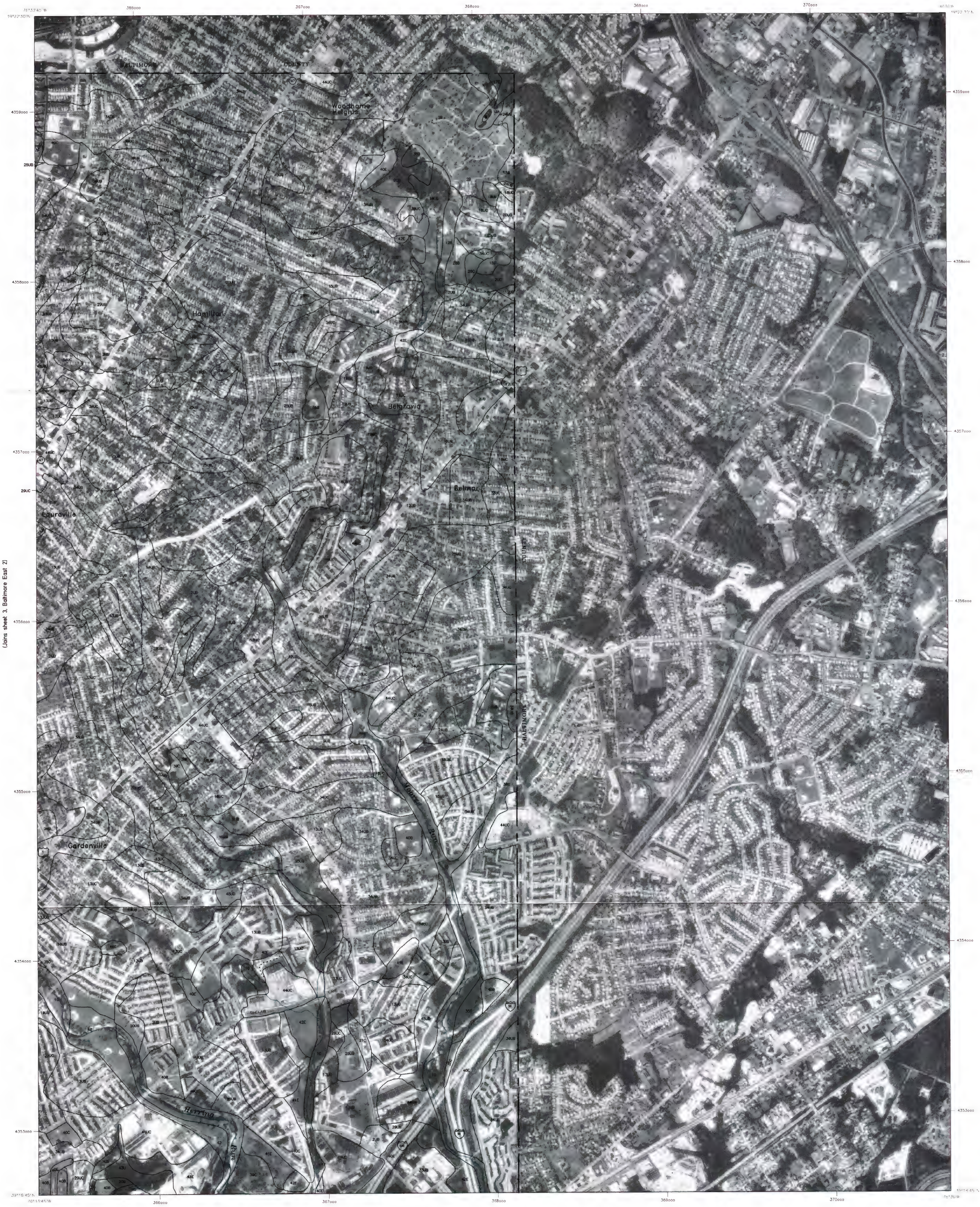
NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
BALTIMORE EAST 1 QUADRANGLE
SHEET NUMBER 4
3.75 MINUTE SERIES



Scale 1:12000

Digital Data: UTM Coordinate System Zone: 18
Polyconic Projection
1983 North American Datum

N

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NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
BALTIMORE WEST 3 QUADRANGLE
SHEET NUMBER 5
3.75 MINUTE SERIES

(Joins sheet 1, Baltimore West 2)

(Joins sheet 6, Baltimore West 4)

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1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:12000

Digital Data: UTM Coordinate System Zone: 18
Polyconic Projection
datum:nad83 Datum

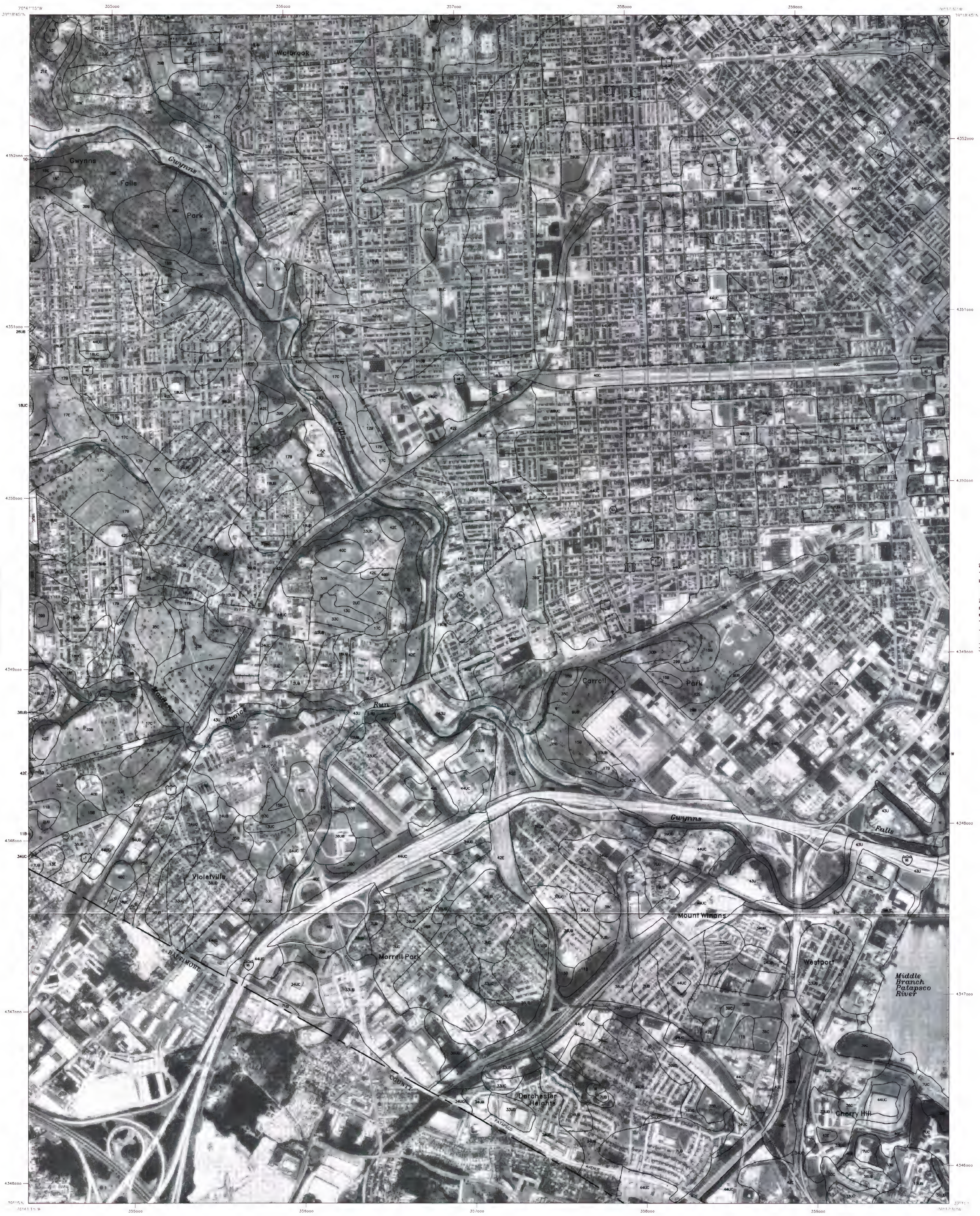
N

SHEET NUMBER 5 OF 11
CITY OF BALTIMORE, MARYLAND
BALTIMORE WEST 3 QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
BALTIMORE WEST 4 QUADRANGLE
SHEET NUMBER 6
3.75 MINUTE SERIES

(Joins sheet 2, Baltimore West 1)



(Joins sheet 9, Relay 1)

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:12000

N

Digital Data: UTM Coordinate System Zone: 18
Polyconic Projection
1983 North American Datum

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SHEET NUMBER 6 OF 11
CITY OF BALTIMORE, MARYLAND
BALTIMORE WEST 4 QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE , MARYLAND
BALTIMORE EAST 3 QUADRANGLE
SHEET NUMBER 7
3.75 MINUTE SERIES

(Joins sheet 3, Baltimore East 2)

(Joins sheet 6, Baltimore West 4)

(Joins sheet 8, Baltimore East 4)

(Joins sheet 10, Curtis Bay 2)

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1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:12000

Digital Data: UTM Coordinate System Zone: 18
Polyconic Projection
datum:nad83 Datum

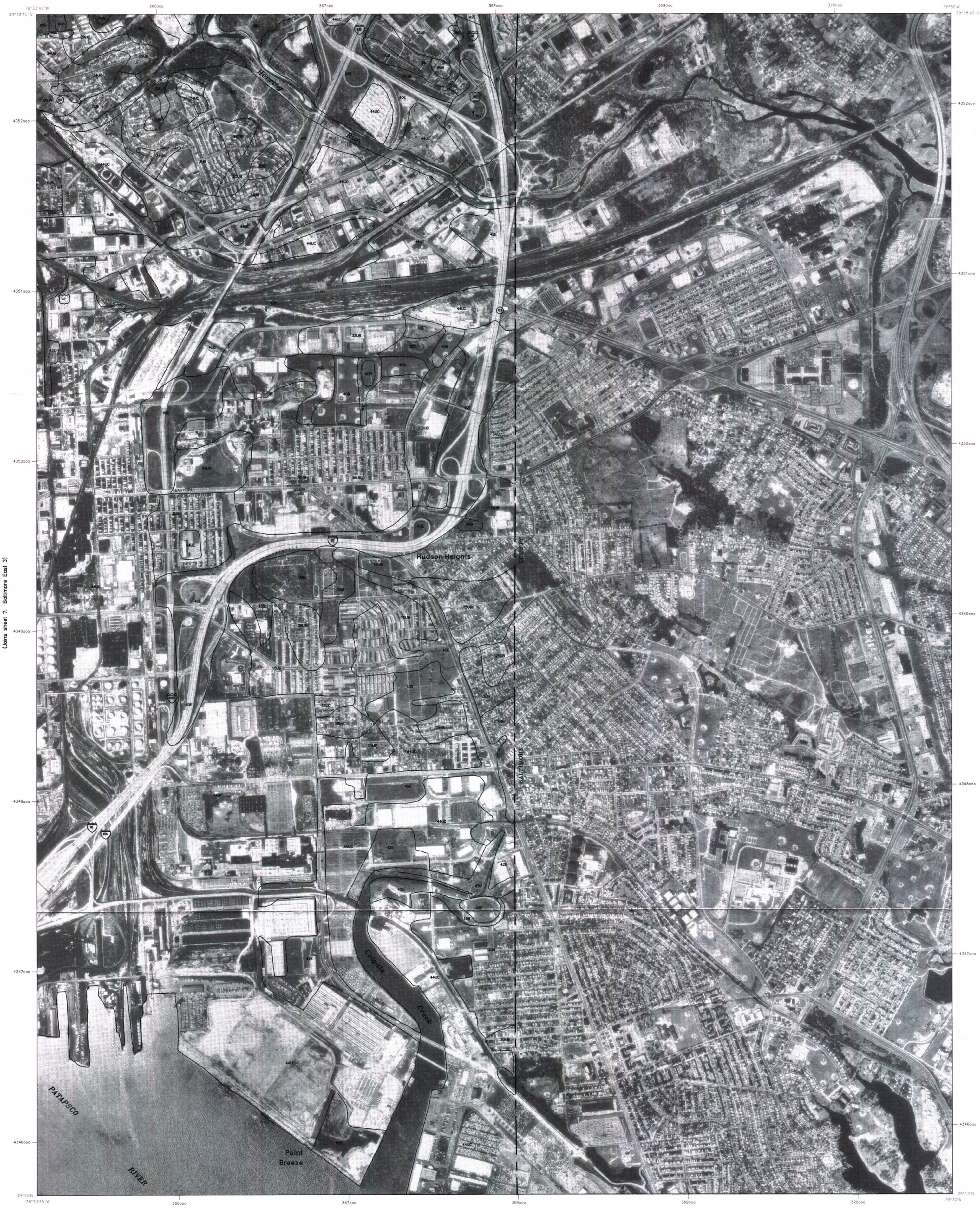
N

SHEET NUMBER 7 OF 11
CITY OF BALTIMORE , MARYLAND
BALTIMORE EAST 3 QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
BALTIMORE EAST 4 QUADRANGLE
SHEET NUMBER 8
3.75 MINUTE SERIES

(Joins sheet 4, Baltimore East 1)



(Joins sheet 7, Baltimore East 3)

(Joins sheet 11, Curtis Bay 1)

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

Scale 1:12000

N

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SHEET NUMBER 8 OF 11
CITY OF BALTIMORE, MARYLAND
BALTIMORE EAST 4 QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
RELAY 1 QUADRANGLE
SHEET NUMBER 9
3.75 MINUTE SERIES

(Joins sheet 6, Baltimore West 4)

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

Scale 1:12000

N

SHEET NUMBER 9 OF 11
CITY OF BALTIMORE, MARYLAND
RELAY 1 QUADRANGLE

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1983 North American Datum

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NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND
CURTIS BAY 2 QUADRANGLE
SHEET NUMBER 10
3.75 MINUTE SERIES

(Joins sheet 7, Baltimore East 3)

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

Scale 1:12000

N

SHEET NUMBER 10 OF 11
CITY OF BALTIMORE, MARYLAND
CURTIS BAY 2 QUADRANGLE

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NATURAL RESOURCES CONSERVATION SERVICE

CITY OF BALTIMORE, MARYLAND

CURTIS BAY 1 QUADRANGLE
SHEET NUMBER 11
3.75 MINUTE SERIES

(Joins sheet 8, Baltimore East 4)

(Joins sheet 10, Curtis Bay 2)

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

Scale 1:12000

Digital Data: UTM Coordinate System Zone: 18
Polyconic Projection
1983 North American Datum

N

SHEET NUMBER 11 OF 11
CITY OF BALTIMORE, MARYLAND
CURTIS BAY 1 QUADRANGLE

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